University of Guelma

Mathematics Dep artment **Master 1** **2011 2012**

English 1 **First exam** **2 hours**

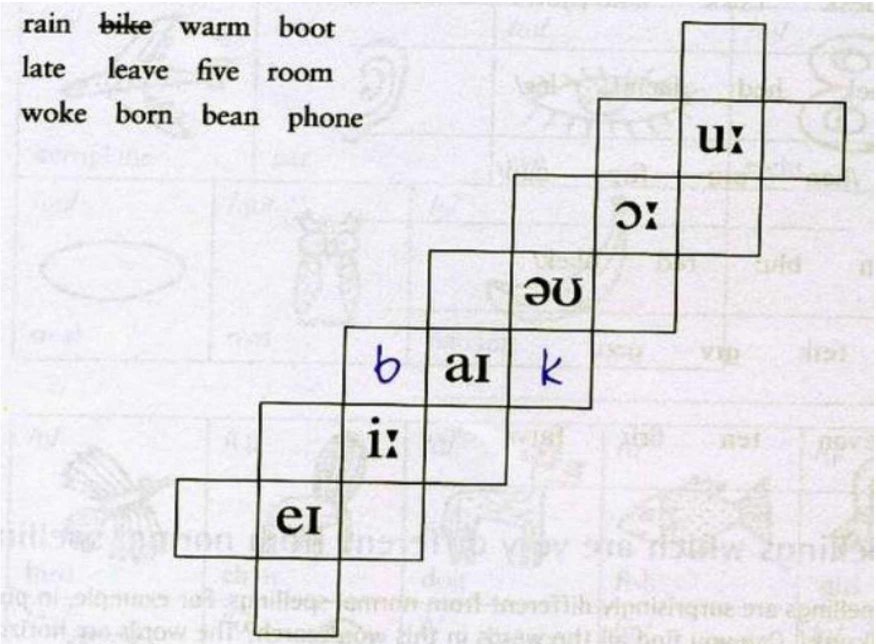
Exercise o1 : Re-write the following words in ordinary English

- ['siːkwəns], ['væljuː], [tə'pɒlədʒɪ], ['ɒpəreɪtə^r]
- ['fɔːmjʊlə], [ˌekspəʊ'nenʃəl], [ˌmæθə'mætɪks], [pruːf]
- [ˌɪn'həʊmə'dʒiːnɪəs], ['iːvən], [ɒd], ['kəʊsaɪn]
- ['sʌbgruːp], [ˌdʒenərəlaɪ'zeɪʃən], [saɪn], ['meʒə^r].

Exercise o2 : Give one word for every symbol

ə	iː	ɪ	æ	e	ʌ	
ɔː	ɒ	ɑː	uː	ʊ	ɜː	
eɪ	eə	aɪ	ɔɪ	aʊ	ɪə	əʊ

Exercise 03 : Complete the following diagram



Exercise o4 : Give the **phonetic** of the following words and phrases

CHAPTER, Operation, Roots, Point, Mathematical induction, lower bound of a sequence, Infinite series, Rules for differentiation, MULTIPLE INTEGRALS, Power series, Orthogonal functions, Residue theorem, The rabbits raced right around the ring.

Exercise o5 : Translate the following sentences in English language.

- En particulier, si la série $\sum u_n$ converge, on obtient le théorème 2 à partir du critère de Cauchy en prenant $p = 0$.
- Soit E un espace vectoriel sur $\mathbb{K}$. Le produit scalaire <,> est une application définie par :
- De plus, on a d'après le lemme (*2*), on peut écrire :
- Ce qui achève la démonstration.

Exercise 06 : Complete the following sentences by using the correspondent mathematical notions

1) $\mathbb{Z}$ The set of ……………………………

2) A mapping with ……………… X and …………….. in Y denoted by

$$f : X \longrightarrow Y$$

3) Consider a square matrix A. A nonzero vector x is an ………………. of the matrix with ………………… ℓ if

$$Ax = \ell x$$

4) A ………………….. has the general form

$$p_n(x) = a_0 + a_1 x + ... + a_n x^n$$

5) *Every ……………… of a convergent sequence converges to the same limit.*

6) The ……….. with ……… **(1,1)** and ………… **3** has the equation

$$(x-1)^2 + (y-1)^2 = 9$$

7) **Theorem :** *A nonempty set S of reals which is bounded above has the ……………………………………………..*

8) Show that the **…………….. series**

$$\sum_{n=1}^{\infty} \frac{1}{n} = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + ...$$

is …………………

9) *Let $\mathcal{R}$ be an equivalence relation on a set A. That means*

$\mathcal{R}$ (**1**) is ……………., (**2**) is ……………., (**3**) is ………………..

10) *The* interior *of A is the union of all open sets ………………… in A*

11) *The* closure *of A is the intersection of all closed sets ………… ……A*

12) A vector v is a ……………… of the vectors x, y and z if it can be written as

$$v = \alpha x + \beta y + \gamma z \ ;$$

where α, β, γ are constants.

13) **………………. ……..Set**

A set of a …………….. *space* H satisfying :

$$\langle e_i, e_j \rangle \quad = \quad \begin{cases} 1 \ ; i = j \\ 0 \ ; \ i \neq j \end{cases}$$

14) A subset E of a *vector space* V is called a ……………….. of V if each *vector* $x \in$ V can be uniquely written in the form

$$x = \sum_{i=1}^{n} \alpha_i e_i \ ; e_i \in E$$

15) The ……………………… $f * g$ of two functions f and g is given by

$$(f * g)(x) \quad = \quad \int f(x-y)\, g(y)\, dy$$

16) Let { $e_1, e_2, \ldots$ } be an orthonormal basis in a Hilbert space $(H,<,>)$. Then every $x \in H$ can be written as a Fourier …………………….

$$x \quad = \quad \sum_{i \in I} \langle x, e_i \rangle \, e_i$$

The ………………….. $< x, e_i >$ are called the Fourier …………………….. of x.

Exercise 07 : Give the conjugation of the verb " **to go**" and complete the table

Present simple He go**es**	Present continuous He ……………	Present perfect He ……………	Present perfect continuous He ……………
Past simple He ……………	past continuous He ……………	Past perfect He ……………	Past perfect continuous He ……………
Future simple He ……………	Future continuous He ……………	Future perfect He ……………	Future perfect continuous He ……………
Conditional present simple He ……………	Conditional present continuous He ……………	Conditional perfect simple He ……………	Conditional perfect continuous He ……………

Good luck   Bellaour Djamel

University of Guelma

Mathematics Dep artment **Master 1** 2011 2012

English 2 **First exam** *2 hours*

Inner product space

In mathematics, a vector space or function space in which an operation for combining two vectors or functions (whose result is called an inner product) is defined and has certain properties. Such spaces, an essential tool of functional analysis and vector theory, allow analysis of classes of functions rather than individual functions. In mathematical analysis, an inner product space of particular importance is a *Hilbert* space, a generalization of ordinary space to an infinite number of dimensions.

A point in a *Hilbert* space can be represented as an infinite sequence of coordinates or as a vector with infinitely many components. The inner product of two such vectors is the sum of the products of corresponding coordinates. When such an inner product is zero, the vectors are said to be orthogonal. *Hilbert* spaces are an essential tool of mathematical physics.

Exercise o1 : (7.5 marks)

1) Give another title of the text. (*1 mark*).
2) Find a word or expression in the text which, in context, is similar in meaning to :

Farness, Series, unlimited, interior, boundless (2.5 marks)

3) Re-write the following words in ordinary English (4 marks)

- [ɪnɪ'kwɒlɪtɪ], [ɪ'nɪʃəl], [pɒlɪ'nəʊmɪəl], [ʌn'baʊndɪd]
- ['ældʒɪbrə], [ɪ'senʃəl], ['neglɪdʒəbl], [dɪfərenʃɪ'eɪʃən]
- [nju:'merɪkəl], [dʒɪ'ɒmɪtrɪ], [prɒbə'bɪlɪtɪ], ['prɒpətɪ]
- [kəm'pli:t], [ju:'klɪdɪən], ['faɪnaɪt, dɪ'menʃənl].

Exercise o2 (4 marks) : Give the phonetic of the following words and phrases

Dimension, operator, orthogonal projection, regular point, self-adjoint , spectrum, minimizing sequence, Countable, triangle inequality, uniform boundedness, Lax–Milgram theorem, successive approximations, extension, differential.

Exercise o3 (2 marks) : Translate the second paragraph of the text in French language.

Exercise o4 (2 marks) : Translate the following paragraph in English language.

Théorème : Pour qu'un espace métrique (E,d) soit complet, il faut et il suffit que, toute suite décroissante de boules fermées de rayons tendant vers zero admette une intersection non vide. (plus précisément, cette intersection est réduite à un seul élément).

<u>Exercise o5</u> (3 marks) : Complete the following sentences by using the correspondent mathematical notions

1) **………………… Series :** A series that ………………….. signs, *i.e.*, of the form :

$$\sum (-1)^n a_n \ ; a_n \geq 0$$

2) Let P be a matrix of ……….………. of a given symmetric matrix A and D a matrix of the corresponding ……………………. Then, A can be written as :

$$A \quad = \quad PDP^{-1}$$

where D is a diagonal matrix.

3) Let A be a bounded linear operator on a *Hilbert* space, H. Then the ………… value of A is given by :

$$|A| \quad = \quad \sqrt{A^* A}$$

where A^* is the ……………… of A.

4) **………………….. Set :**

A set of a ……………….…….. …. H satisfying

$$\langle e_i, e_j \rangle \quad = \quad \begin{cases} 1 \ ; i = j \\ 0 \ ; \ i \neq j \end{cases}$$

5) The set

$$\{1, x, x^2, \ldots, x^n\}$$

is the ……………………… for the vector space of ……………. having degree n or less.

<u>Exercise o6</u> (2 marks) : Give some properties about symmetric matrices. Answer this question in a coherent paragraph.

Good Luck BellaouarDjamel

University of Guelma

Mathematics Dep artment **Master 1** 2011 2012

English 1 **Passing exam** *2 hours*

Exercise o1 (3 marks) : Read the following sentences and choose the correct item.

1. If I had found a fly in my soup I ……………… my wife.
   - **Would have hit**
   - **Hit**
   - **I could have hit**
2. Jame's exam is tomorrow and he ………………… all day.
   - **Studies**
   - **Studied**
   - **Has been studing**
3. I ………………….read or write when I was four years old.
   - **Can't**
   - **coudn't**
   - **wasn't able**
4. The sun ………………………in the west
   - **Is setting**
   - **Set**
   - **sets**
5. It is …………………..colder today than yesterday
   - **Much**
   - **Most**
   - **very**
6. I've a lot of friends in the USA, but …………………..of them have visited me in Guelma.
   - **Non**
   - **neither**
   - **both**

Exercise o2 (3 marks) : Re-write the following words in ordinary English.

/ˈræʃənl/	/pruːf/	/ˈʌnˈkaʊntəbl/	/ˌpɒlɪˈnəʊmɪəl/
/ˈkəʊsaɪn/	/ˈvɒljuːm/	/ˈneglɪdʒəbl /	/ˈdemənstrəbl/
/ˈprɒpətɪ/	/ɪnˈkriːsɪŋ/	/mæθs /	/juːˈklɪdɪən/

Exercise o3 (1 mark) **:** Write the following in full form

$$\sum_{n=1}^{\infty} \|x_n\| < \sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^n = \frac{1}{2}\left(\frac{1}{1-\frac{1}{2}}\right) = 1,$$

Exercise o4 (3 marks) **:** Type `**the**` in gaps or `–` if **the** is not necessary.

Selma : what's on …………....TV tonight?
Jame : There's a new film at eight oclock, but I can't remember ……………..name of it.
Selma : I'd like to watch it. What time's ………….dinner?
Jame : About eight. I don't want to watch and eat at ………. same time.
Selma : No. we can record the film and watch it later tonight.
Jame : I won't because I'm in ……………..middle of reading an exciting book. I want to finish it. If you record it, I'll watch it sometime ……….. next week.
Selma : Ok.

Exercise o5 (7 marks) : Translate the following paragraph in French language.

Differential equation

Mathematical statement containing one or more derivatives, that is, terms representing the rates of change of continuously varying quantities. Differential equations are very common in science and engineering, as well as in many other fields of quantitative study, because what can be directly observed and measured for systems undergoing changes are their rates of change. The solution of a differential equation is, in general, an equation expressing the functional dependence of one variable upon one or more others; it ordinarily contains constant terms that are not present in the original differential equation. Another way of saying this is that the solution of a differential equation produces a function that can be used to predict the behaviour of the original system, at least within certain constraints.

Differential equations are classified into several broad categories, and these are in turn further divided into many subcategories. The most important categories are ordinary differential equations and partial differential equations. When the function involved in the equation depends on only a single variable, its derivatives are ordinary derivatives and the differential equation is classed as an ordinary differential equation. On the other hand, if the function depends on several independent variables, so that its derivatives are partial derivatives, the differential equation is classed as a partial differential equation.

Exercise o6 (3 marks) : Give the phonetic of the following words.

History, could, wood, would, blood, responsibility, divisibility, government, procedure
Operation, equation, page, beige, partial, differential, ordinary.

Good Luck Bellaouar Djamel

University of Guelma

Mathematics Dep artment **Master 1** 2011 2012

English 2 **Passing exam** *2 hours*

Exercise o1 (12 marks) : Translate the following text in French language.

Metric space

In **mathematics**, especially topology, an abstract set with a distance **function**, called a metric, that specifies a nonnegative distance between any two of its points in such a way that the following properties hold: (1) the distance from the first point to the second equals zero if and only if the points are the same, (2) the distance from the first point to the second equals the distance from the second to the first, and (3) the **sum** of the distance from the first point to the second and the distance from the second point to a third exceeds or equals the distance from the first to the third. The last of these properties **is called** the **triangle inequality**. The French mathematician *Maurice Fréchet* initiated the study of metric spaces in 1905.

The usual distance function on the real number line is a metric, as is the usual distance function in Euclidean *n*-**dimensional space**. There are also more exotic examples of interest to mathematicians. Given any set of points, the **discrete** metric specifies that the distance from a point to itself equal 0 while the distance between any two distinct points equal 1. The so-called taxicab metric on the **Euclidean** plane declares the distance from a point (x, y) to a point (z, w) to be $|x - z| + |y - w|$. This "taxicab distance" gives the minimum **length** of a path from (x, y) to (z, w) constructed from horizontal and vertical line segments. In analysis there are several useful metrics on sets of **bounded real-valued continuous** or integrable functions.

Thus, a metric generalizes the notion of usual distance to more general settings. Moreover, a metric on a set X determines a collection of open sets, or topology, on X when a **subset** U of X is declared to be open **if and only if** for each point p of X there is a positive (possibly very small) distance r such that the set of all points of X of distance **less than** r from p is completely contained in U. In this way metric spaces provide important examples of topological spaces.

A metric space is said to be **complete** if every **sequence** of points in which the terms are eventually pairwise arbitrarily close to each other (a so-called Cauchy sequence) converges to a point in the metric space. The usual metric on the **rational** numbers is not complete since some Cauchy sequences of rational numbers do not converge to rational numbers. For example, the rational number sequence 3, 3.1, 3.14, 3.141, 3.1415, 3.14159, … converges to π, which is not a rational number. However, the usual metric on the real numbers is complete, and, moreover, every real number is the limit of a Cauchy sequence of rational numbers. In this sense, the real numbers form the completion of the rational numbers. The **proof** of this fact, given in 1914 by the German mathematician *Felix Hausdorff*, can be generalized to demonstrate that every metric space has such a completion.

Exercise o2 (3 marks) : Complete the table as shown in the example.

Verb	Noun	Adjective
⇒ To integrate	⇒ integration	⇒ Integrable (integrated)
To reduce	……………..	……………..
……………..	boundary	……………..
……………..	……………..	derivable

Exercise o3 (2 marks) : Underline the silent letters in each of the following words.

Daughter, opera, listen, could, answer, comb, night, might, wrong, white, two, yoghurt, cheque, fruit, suit, friend.

Exercise o4 (3 marks) : Re-write the following words in ordinary English.

/ˈræʃənl/	/pruːf/	/ˈʌnˈkaʊntəbl/	/ˌpɒlɪˈnəʊmɪəl/
/ˈkəʊsaɪn/	/ˈvɒljuːm/	/ˈneglɪdʒəbl /	/ˈdemənstrəbl/
/ˈprɒpətɪ/	/ɪnˈkriːsɪŋ/	/mæθs /	/juːˈklɪdɪən/

Good Luck

Bellaouar Djamel

University of Guelma		**First name:** …………………………
Mathematics Dep artment	**Master 1**	**Second name:**……………………….
English 1	**First exam** *2 hours*	2013

Exercise o1(6marks) : Complete the table.

French	Engish	Phonetic (by English)
échantillon	**Sample**	**/ˈsɑːmpl/**
		/ˈsætɪsfaɪɪŋ/
Sinus *x*, dénominateur		
Simultanément		
Suffisant, fermeture [f]		
		/ˌekspəʊˈnenʃəl/
Triangulaire		
Algèbre linéaire		
Inversible		
	Column	
Célèbre		
		/ɪˈkwɪpət/, /ˈmeʒərəbl/
	An eigenvector	
Analyse fonctionnelle		
		/bɔːl/, /ˈbeɪsɪk/
Propriété, appliqué(e)		
Polynôme, idée		
Orthonormée		
, continue	A basis,	
		/ˈkʌpl/, /diːˈkriːsɪŋ/
Analyse numérique		
Multiplicité, facilement		
Voisinage, chapitre		
Minimisation		
		/dʒenərəlaɪˈzeɪʃən/
Valeur propre		
Hypothèse		
Ensemble, densité		
	Homogeneous, method	
		/dɪstrɪˈbjuːʃən/

Exercise o2 (4marks) : Complete the following sentences by using the correspondent mathematical notions

1) The ………………………………… of M is :

$$M^{\perp} = \{x \in E; \langle x, m \rangle = 0 \text{ for all } m \in M\}$$

2) The ……………………………………:

$$\|f + g\| \leq \|f\| + \|g\|$$

3) We call a bounded operator $A : H \rightarrow H$ a …………………. or ……………. operator if and only if for every x,y in H we have :

$$\langle Ax, y \rangle = \langle x, Ay \rangle$$

The arithmetic mean of n numbers $a_1, a_2, ..., a_n$ is

$$x = \frac{a_1 + a_2 + ... + a_n}{n}$$

……………………………… : A property of a distance function

$$f(x, y) \leq f(x, z) + f(z, y) \text{. For all } x, y, z.$$

Let (X,d) be a complete metric space and $T: X \rightarrow X$ a contraction map. Then, T has a ………… point $x_0 \in X$; that means $T(x_0) = x_0$.

For a subset A of a topological space X, the smallest closed set containing A denoted $\overline{A}$

If X is a topological subspace of a metric space, compact is equivalent to a ………….. and ……………...

A topological space X is locally compact if every $p \in X$ has a compact ………………………...

Let X and Y be Banach spaces and T: X→ Y a bounded linear operator. T is called compact if for every bounded sequence $\{x_n\} \subset X$, $\{Tx_n\}$ has a …………………………… in Y.

A measure μ has the property of ……………………… if given $A_1, A_2, ...$ is a sequence of paiwise disjoint measurable sets. Then

$$\mu\left(\bigcup_{i=1}^{\infty} A_i\right) = \sum_{i=1}^{\infty} \mu(A_i)$$

Exercise o3 (4marks) : Write the following notations in full form :

$$\sum_{k=0}^{\infty} \frac{A^k}{k!}$$

$$cA = \{cx \mid x \in A\}.$$

$$\lim_{n\to\infty} \| \sum_{1}^{n} \alpha_i e_i \| = \sqrt{\sum |\alpha_i|^2}$$

$$\lim_{t \longrightarrow 0} \frac{e^{At} - I}{t} = A.$$

Exercise o4 (4 marks)**:** Translate the following sentences in English language.

a) Dans tout le chapitre, Si X est de dimension finie, toute forme linéaire sur X est continue.

b) Une équation différentielle d'ordre n est linéaire ssi elle est de la forme :

Avec quelques propriétés, on peut écrire

c) Toute partie fermée d'un espace métrique complet est un espace métrique complet pour la métrique induite.

d) Considérons la suite de fonctions, monter que les distributions |x|, sgn(x) sont homogènes et determiner leurs degrés respectifs. En déduire la solution dans l'espace D', de l'équation :

$$x\, T = 1.$$

Exercise o5 (2 marks) : What did you study in the **basic functional analysis**?. Give an **abstract** and answer this question in a **coherent** paragraph.

Good Luck

Bellaouar Djamel

University of Guelma

Mathematics Dep artment **Master 1** May 15 2013

English 2 **First exam** **2 hours**

Exercise o1 **(0,25 ×8 marks) :** Re-write the following words in **ordinary** English.

[ə'prəʊtʃ], [enθ], [kɒn'vɜːslɪ],

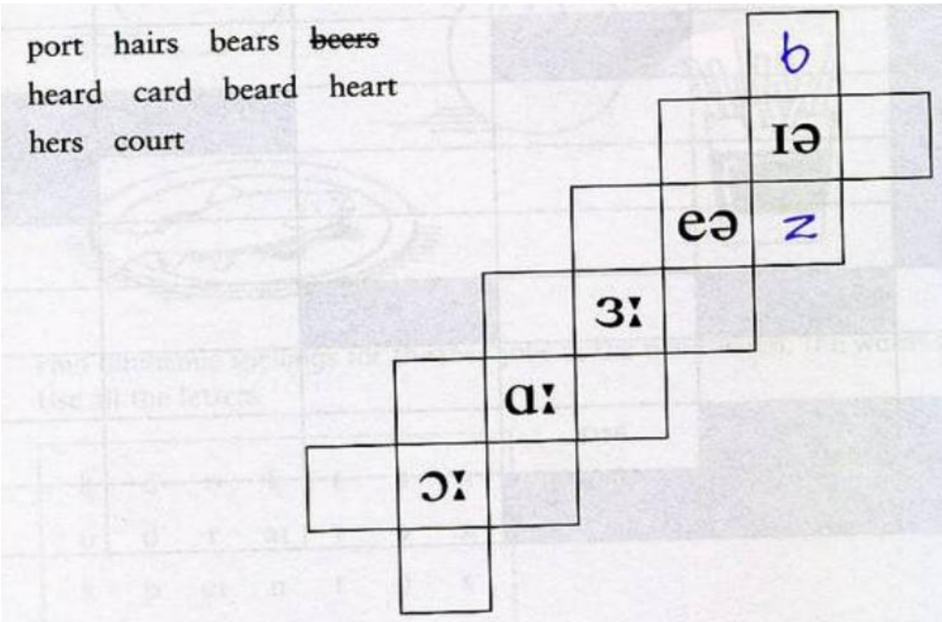
[diː'kriːsɪŋ], [,dɪfərenʃɪ'eɪʃən],

[dɪ'vɪzəbl], [ɪn'tɪərɪəʳ], ['kɜːnl],

Exercise o2 **(0,25 ×8 marks) :** Give the **phonetic** of the following words.

Logarithm, Measurable, Multiplicity, Neighbourhood, Infinitesimal, Quadrature, literature, future.

Exercise o3 **(2 marks) :** Complete the following diagram.



Exercise o4 **(0,50 ×4 marks) :** **Finish the following sentences.**

1. We will stay at home if ………………………………………………………..
2. If I were a rich man. ……………… ……………………………………….
3. I wouldn't say that to her if …………………………………………………
4. I would hit wy wife if ……………………………………………………

Exercise o5 **(0,50 ×5 marks) :** Fill in : **shall** , **will** or **be going to**.

A: What do you want for lunch? **B**: I think I……………..….have chiken and some salad.

A: John has come back from England. **B**: I know I ………………………..…..see him tonight.

A: I haven't got any money. **B**: I …………………………..lend you some if you want me to.

A: Have you decided where to go on holiday? **B:** yes I ……………..….travel round Europe.

A: The plants need watering. **B:** I know I …………………………...…..water them later.

<u>Exercise o6</u> (0,50 ×4 marks) : Put the verbs in brackets into the **correct** tense.

1. Tony ……………………. (**To buy**) a new car last Monday.
2. Her eys were red she ………………………… **(To cry).**
3. What …………………… (**You/ plan**) to do after the exams? …………………… (**You**/ **stay**) at home?.

<u>Exercise o7</u> (2+2,5 marks) : Translate the following paragraph in *English* language.

Analyse Fonctionnelle

L'Analyse Fonctionnelle est née au début du *20*-ème siècle pour **fournir** un cadre abstrait et général à un certain nombre de problèmes, dont beaucoup sont issus de la physique, et où la question posée est la recherche d'une fonction vérifiant certaines propriétés, par exemple une équation aux dérivées partielles (**EDP**).

La théorie moderne de l'intégration (**Lebesgue**, un peu après 1900) et la théorie des espaces de **Hilbert** se sont rejointes pour créer l'un des objets les plus importants, l'espace L_2 des fonctions de carré sommable, qui a permis en particulier de placer la théorie des séries de **Fourier** dans un cadre **conceptuellement** beaucoup plus clair et plus simple que celui qui était en vigueur à la fin du *19*-ème siècle.

<u>Exercise o8</u> (1,5 + 1,5 marks) : Translate the following paragraph in *French* language.

The Jacobi method

Abstract: *We give a general view about Jacobi's method, we describe in this work the method was discovered by Jacobi in 1846 and can used iteratively compute all the **eigenvalues** and **eigenvectors** of real symmetric matrix.*

Open problem: Let $N = 199$. We see that $N - 2n^2$ is prime whenever $2n^2 < N$. It is not known **whether** $N = 199$ is the largest **integer** with this property.

<u>Remark</u>: *Try by yourself. Don't be **deceiver**!* **<u>Bell- Dj</u>** <u>Good luck</u>

University of Guelma

Mathematics Dep artment **Master 1** 2013

English 1 **Passing exam** **1,5 h**

Exercise 01 (4marks): Give the **phonetic** of the following words.
Finitely, infinitely, number, unlimited, distinct, power, multiplicative, literature.
Damascus, politicization, against, Throughout, adjoint, owe, bear, near.

Exercise 02 (8marks): Translate the following paragraph in *English* language.

Intégrale Impropres

Dans l'étude de l'intégrale :

$$\int_a^b f(x)\,dx$$

nous avons supposé l'intervalle dintégration compact (c'est-à-dire fermé et borné) et la fonction *f* bornée. Cette définition de l'intégrale est trop restreinte pour bien des applications. Dans ce chapitre, nous allons généraliser l'intégrale de Riemann en considérant des intervalles non compacts et des fonctions ne nécessairement bornées.

Soit (a, b) où $a < b$ un intervalle (ouvert, fermé ou semi-ouvert). Une fonction $f : (a,b) \to \mathbb{R}$ sera dite localement intégrable sur (a,b) si elle est Reimann-intégrable sur tout sous-intervalle compact $[\alpha,\beta] \subset (a,b)$. On écrira dans ce cas :

$$f \in \mathbb{R}_{loc}(a,b)$$

Exercise 03 (8marks): Translate the following paragraphs in *French* language.

A Numerical solution of differential equations

Abstract. Throughout this work, our aim is to investigate both analytical and numerical techniques for studying the solution of differential equations.

Abstract. We prove the uniqueness of the solution of some operator differential equations with constant periodic coefficients with the help of Green's function, the operator coefficients are unbounded and their domain and range belongs the Hilbert space.

Self adjoint compact operators

Abstract. We call a bounded operator $A: H \to H$ a self-adjoint or symmetric operator if and only if for every x,y in H, we have :

$$\langle Ax,y\rangle = \langle x,Ay\rangle.$$

We start with a few general properties of such operator. We present here the main properties of the self-adjoint operators.

Remark: *Try by yourself. Don't be* ***deceiver****!* Bellaouar Dj **Good luck**

University of Guelma

Mathematics Dep artment **Master 1** 15 – 06 - 2013

English 2 **Passing exam** **1,5 h**

Exercise 01 (10marks): **A)** Turn from active to passive the following statements:

1. In this chapter **we will prove** the contraction mapping theorem.
2. We also **present** some applications.
3. Hilbert **had let** many problems without proof.
4. We **may use** the contraction mapping theorem to prove the existence and uniqueness of solutions.

B) Put the verbs in brackets into the correct tense:

1. If she ……………………..(not break) the window, she wouldn't have had to pay for a new one.
2. If it …………………………(not be) cold, they wouldn't have lit the fire.
3. If she studied more, she ……………………………(be) a better student.
4. If I lived in America, I …………………………..(speak) English well.

C) Give the **phonetic** of the following words.

Assumption, Absolutely, Binomial, characterization, Comparison, Conjecture, Diagonalizable, Homogeneous

Exercise 02 (10marks): Translate the following paragraphs in *French* language.

Complete closed subspaces in a seminormed space

Abstract.

The absolute value function on $\mathbb{R}$ and the modulus on $\mathbb{C}$ are denoted by $|.|$ and each gives a notion of lenght or distance in the corresponding space and permits the discussion of convergence of sequences in that space or continuity of functions on that space. In this work, we shall extend these concepts to a general linear space E.

A seminorm on the linear space E is a function p: $E \to \mathbb{R}$ for which $p(\alpha x) = |\alpha|\, p(x)$ and $p(x+y) \leq p(x) + p(y)$ for all $\alpha \in \mathbb{K}$ and $x,y \in E$. The pair (E,p) is called a seminormed space. We study some properties concerning seminormed spaces, for example, a closed subspace of a seminormed space is complete but the reciprocal is false. Finally, we prove that a complete subspace of a normed space is closed.

Key words and phrases. Functional analysis, seminormed spaces, normed spaces, subspaces, completeness.

Remark: *Try by yourself. Don't be* ***deceiver****!* *Bellaouar Dj* **Good luck**

University of Guelma

Mathematics Department **Master 1**

English 1 **First exam** *2 hours* *January 18th, 2014*

Exercise o1 (5 marks): Translate the following sentences in English language.

a) Autrement dit, il suffit de prouver que. Il vient donc
b) Considérons un opérateur différentiel linéaire à coefficients constants
c) La condition est nécessaire, puisque pour toute fonction $\phi \in D$, on a
d) **Théorème :** Toute suite convergente dans un espace métrique est une suite de Cauchy.
e) Une application vérifiant les propriétés suivantes :
f) Un voisinage d'un point a est une partie de E contenant une boule ouverte centrée en a.
g) **Théorème de Riesz**. Si la boule unité d'un **evn** $(E, \|.\|)$ est compact, alors, E est de dimension finie.
h) **Exercice :** Une application multilinéaire continue entre un produit d'espaces vectoriels normés et un espace vectoriel normé est lipschitzienne sur chaque sous-ensemble borné.
i) Nous obtenons donc la formule générale, d'après l'hypothèse, on trouve
j) Donc le *sup* existe. Inversement, soit E un espace de Hilbert muni d'une base hilbertienne

Exercise o2 (3 marks): Read the following sentences and choose the correct item.

- How would you feel if you ……………your car?
  - **crash**
  - **will crash**
  - **crashed**
- If I were you, I …………………..to bed early.
  - **will go**
  - **would go**
  - **won't go**
- Was ……………..man who robbed the bank arrested?
  - **a**
  - **an**
  - **the**
- I'm hungry but there's ………………..in the fridge for me to eat.
  - **anything**
  - **nothing**
  - **something**
- Their house is …………………than ours.
  - **big**
  - **bigger**
  - **biggest**

- Don't worry. I'm sure he ……………..to you soon.

- **writes**
- **will write**
- **would write**

<u>Exercise o3</u> (3 marks): Re-write the following words in ordinary English.

/ˈɒbvɪəs/	/ˈnɜːvəs/	/dɪsˈkʌs/	/ˌpɒlɪˈnəʊmɪəl/
/ˈpriːvɪəs/	/ˈsɪərɪəs/	/ɪnˈkriːsɪŋ/	/ˈneɪbəhʊd]/
/ˈpeɪʃənt /	/ ˈspeɪʃəs /	/ˈʌnˈkaʊntəbl/	/juːˈklɪdɪən/

<u>Exercise o4</u> (2.5 marks) : Give the phonetic of the following words and phrases.

- ✓ Height, weight, suggest a substitution, some questions
- ✓ Operator, temperature, future and literature.

<u>Exercise o5</u> (1,5 mark) : Write the following in full form.

$$\mathbb{M}_n(\mathbb{R}) = S_n(\mathbb{R}) \oplus A_n(\mathbb{R})$$

(i) ....

$$\lim_{t \longrightarrow 0} \frac{e^{At} - I}{t} = A.$$

(ii) Prove that the ....

$$\left\| \frac{A^k}{k!} \right\| \leq \frac{\|A\|^k}{k!}$$

(iii) Show that the ....

<u>Exercise o6</u> (3 marks): Complete the following sentences by using the correspondent mathematical notions.

1. f is said to be a .... on $[a, b]$ if there exists a constant L such that $0 < L < 1$ and

$$|f(x) - f(y)| \leq L|x - y|; \forall\ x, y \in [a, b]$$

2. We may denote a .... by the notation

$$f : X \to Y, \quad x \mapsto f(x),$$

3. The special notation ∅ is reserved for the .... set, the set with no elements. The .... set is a subset of any set.

4. .... and .... are the most basic concepts of mathematics. Given any .... x and any .... X, either x belongs to X (denoted $x \in X$), or x does not belong to X (denoted $x \notin X$).

5. Let (X, d) be a metric space. An .... of radius $\varepsilon > 0$ centered at a is

$$B_d(a, \varepsilon) = \{x : d(x, a) < \varepsilon\}$$

6. If X is .... and $f : X \to Y$ is continuous , then, $f(X)$ is compact.

7. A subset of $\mathbb{R}^n$ is compact ⇔ the subset is .... and ....

<u>Exercise o7</u> (2 marks) : Choose one ***topic***

<u>I</u> : Translate the following paragraph in Arabic or French language.

Topological Basis

The key topological concepts and theories for metric spaces can be introduced from balls. In fact, if we carefully examine the definitions and theorems about open subsets, closed subsets, continuity, etc., then we see that we have used exactly two key properties about the balls. Whether or not we have a metric, as long as we have a system of balls satisfying these two properties, we should be able to develop similar topological theory. This observation leads to the concept of topological basis.

<u>II</u> : What did you study in the **basic numerical analysis**?. Give an **abstract** and answer this question in a **coherent** paragraph.

Good Luck

Bellaouar Djamel

University of Guelma

Mathematics Department **Master 1**

English 2 **Second Exam** *2 hours* *May 20th, 2014*

Exercise o1 (0.25×24 marks): Translate the following sentences in English language.

1. Déterminer si les ensembles suivants sont bornés.
2. Cas le plus général d'espace topologique.
3. Fonctions complexes et continuité.
4. Continuité et limite dans les espaces métriques ou normés.
5. Le théorème principal sur les résidus.
6. Polynômes et fonctions rationnelles.
7. Soit N un entier positive suffisament grand.
8. Topologie et approximation de fonctions caractéristiques.
9. Dans la prochaine section on présentera une des applications les plus importantes du Théorème 1.
10. Comment déterminer un rayon de convergence ?
11. **Définition** . Le complémentaire d'un sous ensemble ouvert de X sera appelé sous en-semble fermé.
12. **Proposition**
    - X et ∅ sont fermés.
    - Une réunion finie de fermés est fermée.
    - Une intersection quelconque de fermés est fermée.
13. D'autre part, il existe un élément $x \in E$ tel que.
14. Opérations élémentaires sur les distributions.
15. Table des matières.
16. Polynômes orthogonaux, Orthogonalité.
17. Tout polynôme positif est somme de deux carrés.
18. Considérons ensuite la fonction f définie par :
19. Plus généralement, on a le résultat suivant.
20. Si **Ω** est un ouvert borné à frontière **lipschitzienne**, alors
21. Groupe orthogonal réel et groupe spécial orthogonal réel .
22. Quelques résultats supplémentaires d'arithmétique et théorie des nombres.
23. En appliquant systématiquement cette formule, nous obtenons

24. **Remarque**. D'une façon plus générale, on peut prouver que les applications f, g sont linéaires continues pour la convergence dans D.

Exercise o2 (0.25×8 marks): Underline the correct item

1. John and Selma are listening to music **every day** / **at the moment**.
2. He **bought** / **has bought** a new computer last week.
3. I've lived here **since** / **for** 1990.
4. She usually **is visiting** / **visits** her grandparents on sundasy.
5. This exercise is very **easily** / **easy**

6. Bob is the best student **of** / **in** our class.
7. The **chair's leg** / **leg of the chair** is broken
8. That's the house **where** / **which** I grew up

<u>Exercise o3</u> (0.125×7 mark): Fill in : **who, whose, what, where, when, why, which**

……………… are you looking for? My keys
……………… do you live? In Guelma
……………… is your car? The blue one
………………was she angry? Because someone had stolen her bag
……………… is Mister John? The new English teacher
………………will you come back? Next Friday
……………… is this soutcase? I don't know.

<u>Exercise o4</u> (0.25×8 marks): Add question tags to the following statements

- He likes apples, doesn't he?
- She doesn't like apples, does she?
- He never understands, does he?
- She is sleeping, isn't she?
- He came too late, didn't he?
- He didn't come too late, did he?
- Let him come with us, won't you?
- Ther is no one here, is there?

<u>Exercise o5</u> (0.125×15 marks): Re-write the following words in **ordinary** English.

- ['sentəns], [kən'tɪnjʊəs], [,sɪməl'teɪnɪəs], ['speɪʃəs]

  ['deɪndʒrəs], [glʌv], [dɪ'sɪʒən]

- fræŋk, faʊnd, fɔːʳ, frɒg, 'lɑːfɪŋ, ɒn, ðə, flɔːʳ

<u>Exercise o6</u> (0.25×22 marks): Complete the following sentences by using the correspondent mathematical notions

1. $\mathbb{N}$ The set of ……………………………
2. $\mathbb{Q}$ The set of ……………………………
3. $\mathbb{R}$ The set of ……………………………
4. Consider a square matrix *A*. A nonzero vector *x* is an ………………. of the matrix with ………………… ℓ if $Ax = \ell x$.
5. A ………………….. has the general form

$$p_n(x) = a_0 + a_1 x + ... + a_n x^n$$

6. Every ……………… of a convergent sequence converges to the same limit.

7. The ……….. with ……… (1,1) and ………… 3 has the equation

$$(x-1)^2 + (y-1)^2 \quad = \quad 9$$

8. **Theorem :** *A nonempty set $\mathcal{S}$ of reals which is bounded above has the* ……………………………………………..
9. Show that the **…………….. series**

$$\sum_{n=1}^{\infty} \frac{1}{n} = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + ...$$

is ………………….

10. Let $\mathcal{R}$ be an equivalence relation on a set *A*. That means

$\mathcal{R}$ $(\mathbf{1})$ is ……………., $(\mathbf{2})$ is ……………., $(\mathbf{3})$ is ………………..

11. The interior of *A* is the union of all open sets ……………….. in *A*

12. The closure of *A*is the intersection of all closed sets …………. ……*A*

13. A vector *v* is a ……………… of the vectors *x, y* and *z* if it can be written as

$$v = \alpha x + \beta y + \gamma z \ ;$$

where α, β, γ are constants.

14.………………. ……..Set

15. A set of a …………….. space *H* satisfying :

$$\langle e_i, e_j \rangle \quad = \quad \begin{cases} 1 \ ; i = j \\ 0 \ ; \ i \neq j \end{cases}$$

16. A subset *E* of a vector space *V* is called a ………………. of *V* if each vector *x* ∈ *V* can be uniquely written in the form

$$x = \sum_{i=1}^{n} \alpha_i e_i \ ; e_i \in E$$

<u>Exercise o7</u> (1.57 marks) : What did you study in the **basic Algebra (1, 2, 3 and 4)**? Give an **abstract** and answer this question in a **coherent** paragraph.

<u>Good Luck</u>

English 2 **Passing Exam** *1h,30 mn* *June 15th, 2015*

Exercise 1 (2 marks). Write the phonetic of :

- *Which child put chalk on the teacher's chair ?*
- *Frank found four frogs laughing on the floor.*

Exercise o2 (2 marks)

Add **ed** to the verbs and put them in the correct column: ‘’cry, stay, stop, hate, taste, prefer, fry, dance, certify, apply, equip, travel, dry, annoy, enjoy, occupy, realize, oppose, serve, stop, play, refuse, destroy, cut, come, end.

+ d	+ ied	+ ed	Double consonant + ed

Exercise 3 (2 marks). What is the time ?

9:00 : *It is nine o'clock.*

9:05, 8:55, 9:10, 8:50, 8:45, 9:20, 8:40, 9:25, 8:35, 9:30, 13:58.

Exercise 4 (9 marks). Write the following formulas in full form :

$$x_n \underset{n\to\infty}{\longrightarrow} 0$$

$$\lim_{x\to 0} \frac{f''(x)}{F''(x)} = \lim_{x\to 0} \frac{-e^x}{4} = -\frac{1}{4}.$$

$$r = \sqrt{x^2 + y^2}$$

$$A \sim B \Longrightarrow e^A \sim e^B$$

$$A_n = \{x \in A \mid x \leq n\}$$

$$\left\| \frac{A^k}{k!} \right\| \leq \frac{\|A\|^k}{k!}$$ $$A \neq \emptyset$$ $$p \notin R.$$

$$\left| \sum_{k=1}^{n} x_k \right| \leq \sum_{k=1}^{n} |x_k|.$$ $$A_1 \times A_2 \times \cdots \times A_n$$

$$\langle f, g \rangle = \int_a^b f(x)\, g(x)\, dx$$

♦) $\forall\ x \in E : \|x\| \geq 0$, et $\|x\| = 0 \Leftrightarrow x = 0$
♦) $\forall\ \lambda \in \mathbb{K}, \forall\ x \in E : \|\lambda x\| = |\lambda| . \|x\|$
♦) $\forall\ x, y \in E : \|x + y\| \leq \|x\| + \|y\|$.

$$\mathbb{M}_n(\mathbb{R}) = S_n(\mathbb{R}) \oplus A_n(\mathbb{R})$$

$$|gf| = gf \text{ and } \left(\frac{|g|}{\|g\|_q}\right)^q = \left(\frac{|f|}{\|f\|_p}\right)^p \text{ a.e.}$$

<u>Exercise o5</u> (5 marks): Translate the following sentences in English language.

1. Notre premier objectif est de munir R d'une structure de corps commutatif. Rappelons que Q désigne le corps des nombres rationnels.

2. Où *c* est une contante arbitraire. De (1) et (2) on déduit que

3. La solution (3) s'appelle solution de D'Alembert.

4. Équation différentielle linéaire homogène d'ordre supérieur.

Good Luck

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+ d	+ ied	+ ed	Double consonant + ed
danced	cried	stayed	stopped
hated	fried	prefered	equipped
tasted	certified	annoyed	travelled
danced	applied	enjoyed	stopped
realised	dried	played	
opposed	occupied	destroyed	
sered		ended	
refused			

Exercise 3 (2 marks). What is the time ?

***9:00 :** It is nine o'clock.* It is nine o'clock **9:00**, It is five past nine **9:05** , It is five to nine **8:55**, It is ten past nine **9:10**, It is ten to nine **8:50**, It is quarter to nine **8:45**, It is twenty past nine **9:20** , It is twenty to nine **8:40**

It is twenty five past nine **9:25**, It is twenty five to nine **8:35**, It is half past nine **9:30**, Two to two

Exercise 4 (9 marks). Write the following formulas in full form :

$$x_n \underset{n\to\infty}{\longrightarrow} 0$$

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$$A_n = \{x \in A \mid x \leq n\}$$

$$\left\|\frac{A^k}{k!}\right\| \leq \frac{\|A\|^k}{k!}$$

$A \neq \emptyset$ $\qquad$ $p \notin R.$

$$\left|\sum_{k=1}^{n} x_k\right| \leq \sum_{k=1}^{n} |x_k|.$$

$$A_1 \times A_2 \times \cdots \times A_n$$

$$\langle f, g\rangle = \int_a^b f(x)\, g(x)\, dx$$

♦) $\forall\ x \in E : \|x\| \geq 0$, et $\|x\| = 0 \Leftrightarrow x = 0$
♦) $\forall\ \lambda \in \mathbb{K}, \forall\ x \in E : \|\lambda x\| = |\lambda| \,.\, \|x\|$
♦) $\forall\ x, y \in E : \|x + y\| \leq \|x\| + \|y\|$.

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2. Où *c* est une contante arbitraire. De (1) et (2) on déduit que

3. La solution (3) s'appelle solution de D'Alembert.

4. Équation différentielle linéaire homogène d'ordre supérieur.

University of Guelma

Department of Mathematics **Master 1**

English 1 **Passing Exam** *1,5 hours* *June 10th, 2015*

Exercise o1 (0.5×8 marks): Complete the following table

word	opposite	word	opposite
Countable		Empty	
Decreasing		Bounded	
Logarithm		Commutative	
Prime Number		Homogeneous	

Exercise o2 (12 marks): Read carefully the following text.

Number theory (or arithmetic) is a branch of pure mathematics devoted primarily to the study of the integers, sometimes called "The Queen of Mathematics" because of its foundational place in the discipline. Number theorists study prime numbers as well as the properties of objects made out of integers (e.g., rational numbers) or defined as generalizations of the integers (e.g., algebraic integers). Many questions regarding prime numbers remain open, such as Goldbach's conjecture (that every even integer greater than 2 can be expressed as the sum of two primes), and the twin prime conjecture (that there are infinitely many pairs of primes whose difference is 2). Such questions spurred the development of various branches of number theory, focusing on analytic or algebraic aspects of numbers. Primes are used in several routines in information technology, such as public-key cryptography, which makes use of properties such as the difficulty of factoring large numbers into their prime factors. Prime numbers give rise to various generalizations in other mathematical domains, mainly algebra, such as prime elements and prime ideals.

Questions:

1. Give a suitable title of the text. Complete the following sentence:

Mathematics is the …………………of sciences and Number Theory is the ……………..of Mathematics.

2. Find a word or expression in the text which, in context, is similar in meaning to :

Theoretician, different, to stay, piece of news, essentially.

3. Give the phonetic of the text.

Exercise o3 (1×4 marks): Change the direct speech into reported speech.

1. “I won't vote at the next election.” She said ………..
2. “Richard won't drink coffee.” She said …………….
3. “We ate Chinese food, then we walked home.” She told me ……….
4. “She didn't buy the dress.” He told me …………

Good Luck

Exercise o1 (0.5×8 marks): Complete the following table

word	opposite	word	opposite
Countable	uncountable	Empty	nonempty
Decreasing	increasing	Bounded	unbounded
Logarithm	Exponential	Commutative	noncommutative
Prime Number	Composite number	Homogeneous	inhomegeneous

Exercise o2 (12 marks):

3. Give the phonetic of the text.

['nʌmbəʳ] ['θɪərɪ] [ɔːʳ] ɪz ə [brɑːntʃ] ɒv [pjʊəʳ] [,mæθə'mætɪks]

devoted primarily to the study of the integers, sometimes called "The Queen of Mathematics" because of its foundational place in the discipline. Number theorists study prime numbers as well as the properties of objects made out of integers (e.g., rational numbers) or defined as generalizations of the integers (e.g., algebraic integers). Many questions regarding prime numbers remain open, such as Goldbach's conjecture (that every even integer greater than 2 can be expressed as the sum of two primes), and the twin prime conjecture (that there are infinitely many pairs of primes whose difference is 2). Such questions spurred the development of various branches of number theory, focusing on analytic or algebraic aspects of numbers. Primes are used in several routines in information technology, such as public-key cryptography, which makes use of properties such as the difficulty of factoring large numbers into their prime factors. Prime numbers give rise to various generalizations in other mathematical domains, mainly algebra, such as prime elements and prime ideals.

Questions:

1. Give a suitable title of the text. **The Queen of Mathematics.**

Complete the following sentence:

Mathematics is the **Queen** of sciences and Number Theory is the **Queen** of Mathematics.

2. Find a word or expression in the text which, in context, is similar in meaning to :

Theoretician, different, to stay, piece of news, essentially.

Theorists, various, remain, information, primarily

Exercise o3 (1×4 marks): Change the direct speech into reported speech.

1. “I won't vote at the next election.” She said **that she woudn’t vote at the next election.**
2. “Richard won't drink coffee.” She said **that Richard wouldn’t drink coffee.**
3. “We ate Chinese food, then we walked home.” She told me that she had eaten Chinese food, then we walked home.
4. “She didn't buy the dress.” He told me she hadn’t bought the dress.

University of Guelma

Department of Mathematics **Master 1**

English 2 **First Exam** *2 hours* *May 28, 2015*

Exercise o1 (0.25×16 marks):

A) Complete the following sentences.

1. Last night I …………… (to lose) my keys. I had to call my brother to let me in.

2. I ……………….. (to lose) my keys. Can you help me look for them?

3. I ………………….. (to visit) Paris three times.

4. I …………… ……. (drink) three cups of coffee this morning.

B) Complete the following conjugation by using the verb (to see).

He **sees**	He **is seeing**	He	He **has been seeing**
He	He	He	He
He	He	He	He
He	He	He	He

Exercise o2 (0.50×8 marks): Change the direct speech into reported speech. Choose the past simple of 'ask', 'say'or 'tell':

1. "Come quickly!"

She …………………………………………………………………………………………………

2. "Did you arrive before seven?"

She …………………………………………………………………………………………………

3. "I usually drink coffee in the mornings"

She…………………………………………………………………………………………………

4. "I'll come and help you on Saturday"

She…………………………………………………………………………………………………

5. "I would have visited the hospital, if I had known you were sick"

She …………………………………………………………………………………………………

6. "I'll come and help you at twelve"

She ……………………………………………………………………………………….……………

7. “What are you doing tomorrow?”

She ……………………………………………………………………………………….……………

8. “I’ve never been to Wales”

She…………………………………………………………………………………….……………

<u>Exercise o3</u> (0.25×12 marks): Re-write the following words in **ordinary** English.

[pəˈzɪʃən]	[ˈkʌrɪdʒ]	[ɪnˈʃʊərəns]
[pəˈzeʃən]	[kəmˈpæʃən]	[æmˈbɪʃəs]
[əˈʃʊərəns]	[ˈfɔːtʃənɪtlɪ]	[ˈpreʃəs]
[ˈpræktɪs]	[ˈpræktɪs]	[ˈkɒnʃəs]

<u>Exercise o4</u> (0.25×12 marks): Complete the following sentences by using the correspondent mathematical notions.

- f is said to be a …………………….. on [a, b] if there exists a constant L such that $0 < L < 1$ and

$$|f(x) - f(y)| \leq L|x - y|\,; \forall\ x, y \in [a, b]$$

- We may denote a ………………by the notation

$$f : X \to Y, \quad x \mapsto f(x),$$

- The special notation ∅ is reserved for the ……………… set, the set with no elements. The ……………… set is a subset of any set.

- ………… and ……………… are the most basic concepts of mathematics. Given any ………… x and any ……………… X , either x belongs to X (denoted $x \in X$), or x does not belong to X (denoted $x \notin X$).

- Let (X, d) be a metric space. An ………………… of radius $\varepsilon > 0$ centered at a is

$$B_d(a, \varepsilon) = \{x : d(x, a) < \varepsilon\}$$

- If X is …………… and $f : X \to Y$ is continuous , then, $f(X)$ is compact.
- A subset of $\mathbb{R}^n$ is compact $\Leftrightarrow$ the subset is …………. and ………….

Exercise o5 (0.5×12 marks): Translate the following sentences in English language.

1. Déterminer si les ensembles suivants sont bornés.
2. Continuité et limite dans les espaces métriques ou normés.
3. Le théorème principal sur les résidus.
4. Polynômes et fonctions rationnelles.
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6. Topologie et approximation de fonctions caractéristiques.
7. Dans la prochaine section on présentera une des applications les plus importantes du Théorème 1.
8. Comment déterminer un rayon de convergence ?
9. *Définition* . Le complémentaire d'un sous ensemble ouvert de X sera appelé sous en-semble fermé.

10. Proposition.

- X et $\emptyset$ sont fermés.
- Une réunion finie de fermés est fermée.
- Une intersection quelconque de fermés est fermée.

11.Si Ω est un ouvert borné à frontière *lipschitzienne*, alors

12. Quelques résultats supplémentaires d'arithmétique et théorie des nombres.

Exercise o6 (1,5 marks) : Write the following mathematical notations in full form.

$$\lim_{t \longrightarrow 0} \frac{e^{At} - I}{t} = A. \qquad \sum_{k=1}^{\infty} \frac{1}{(2k+1)^2} = \frac{\pi^2}{24} - 1 \qquad \frac{\partial^2 f}{\partial x^2}$$

Bellaouar Djamel

GOOD LUCK

University of Guelma

Mathematics Department **Master 1**

English 2 **First Exam** *2 hours* *May 28, 2015*

Exercise o1 (0.25×16 marks):

A) Complete the following sentences.

1. Last night I lost (to lose) my keys. I had to call my brother to let me in.

2. I have lost (to lose) my keys. Can you help me look for them?

3. I have visited (to visit) Paris three times.

4. I have drunk (drink) three cups of coffee this morning.

B) Complete the following conjugation by using the verb (to see).

He sees	He is seeing	He has seen	He has been seeing
He saw	He was seeing	He had seen	He had been seeing
He will see	He will be seeing	He will have seen	He will have been seeing
He would see	He would be seeing	He would have seen	He would have been seeing

Exercise o2 (0.50×8 marks): Change the direct speech into reported speech. Choose the past simple of 'ask', 'say'or 'tell':

1. "Come quickly!"

She told me to come quickly.

2. "Did you arrive before seven?"

She asked me if I arrived (had arrived) before seven.

3. "I usually drink coffee in the mornings"

She said that she usually drank coffee in the mornings.

4. "I'll come and help you on Saturday"

She said that she would come and help me on Saturday.

5. "I would have visited the hospital, if I had known you were sick"
She said (that) she would have visited the hospital, if she had known I was

sick.

6. “I’ll come and help you at twelve”

She said that she would come and help me on Saturday.

7. “What are you doing tomorrow?”

She asked me what I was doing tomorrow (the day after).

8. “I’ve never been to Wales”

She said (that) she would come and help me at twelve.

<u>Exercise o3</u> (0.25×12 marks): Re-write the following words in **ordinary** English.

[pə'zɪʃən] **Position**	['kʌrɪdʒ] **Courage**	[ɪn'ʃʊərəns] **Insurance**
[pə'zeʃən] **Possession**	[kəm'pæʃən] **compassion**	[æm'bɪʃəs] **Ambitious**
[ə'ʃʊərəns] **Assurance**	['fɔːtʃənɪtlɪ] **fortunately**	['preʃəs] **Precious**
['præktɪs] **Practice**	['præktɪs] **Practise**	['kɒnʃəs] **Conscious**

<u>Exercise o4</u> (3 marks): Complete the following sentences by using the correspondent mathematical notions.

- f is said to be a **contraction** on $[a, b]$ if there exists a constant L such that $0 < L < 1$ and

$$|f(x) - f(y)| \leq L|x - y|\,; \forall\; x, y \in [a, b]$$

- We may denote a ...**map**... by the notation

$$f : X \to Y, \quad x \mapsto f(x),$$

- The special notation Ø is reserved for the **empty** set, the set with no elements. The **empty** set is a subset of any set.

- **Sets** and ...**elements**... are the most basic concepts of mathematics. Given any **lement** x and any ...**Set**... X , either x belongs to X (denoted $x \in X$), or x does not belong to X (denoted $x \notin X$).

- Let (X, d) be a metric space. An ......**open ball**..... of radius $\varepsilon > 0$ centered at a is

$$B_d(a, \varepsilon) = \{x : d(x, a) < \varepsilon\}$$

- If X is ...**compact**... and $f : X \to Y$ is continuous , then, $f(X)$ is compact.
- A subset of $\mathbb{R}^n$ is compact $\Leftrightarrow$ the subset is ...**closed** and ...**bounded**...**.**

<u>Exercise o5</u> (0.5×12 marks): Translate the following sentences in English language.

1. Determine if the following sets are bounded.

2. Continuity and limit in the metric spaces or normed spaces.

3. The main theorem on residues.

4. Polynomials and rational functions.

5. Let N be a sufficiently large positive integer.

6. Topology and characteristic approximation functions.

7. In the next section we will present one of the most important use of Theorem 1

8. How to determine the radius of convergence?

9. Definition. The complementary of an open subset of X will be called closed subsset.

10. *Proposition.*

    - X and ∅ are closed.
    - A finite union of closed is closed.
    - Any intersection of closed is closed.

11. If Ω is an open bounded with a *lipschitzian* boundary, then

12. Some supplementary results of arithmetic and number theory.

<u>Exercise o6</u> (1,5 marks) **:** Write the following mathematical notations in full form

$$\lim_{t \longrightarrow 0} \frac{e^{At} - I}{t} = A.$$

Prove that the limit as *t* tends to zero of exponential *A*, *t* minus *I*, over *t* equals *A*.

$$\frac{\partial^2 f}{\partial x^2}$$

The second partial derivative of *f* by *x* (with respect to *x*)

$$\sum_{k=1}^{\infty} \frac{1}{(2k+1)^2} = \frac{\pi^2}{24} - 1$$

The sum from k eaquals one to infinity of one over two k plus one all squared equals pi squared over twenty four minus one.