جامعة طنطا	الفرقة: الرابعة (ش.الرياضيات)	دور يناير ٢٠١٥
كلية العلوم	المادة: التحليل الدالي رمز المقرر ٤١٥١	الزمن: ساعتان

أجب عن الأسئلة التالية:

1) a. Define M.S X and give 3 examples .
   b. Define H.S X and give 2 examples .

2) a. $x_n \to x$ $\Longleftrightarrow$ ... $\Longleftrightarrow$ ... $\Longleftrightarrow$ ...
   b. $\{ x_n \}$ is C.seq $\Longleftrightarrow$ ... $\Longleftrightarrow$ ... $\Longleftrightarrow$ ...
   c. P.t $d(x,y) = \sqrt{|x-y|}$ is dist. F in R.

3) a. Give 3 examples of N.S X .
   b. P.t x y $\Longleftrightarrow$ $\|x-3y\|^2 = \|x\|^2 + 9\ \|y\|^2$.

4) a. $\|x-3y\|^2 + \|x+3y\|^2 = \ldots + \ldots$.
   b. $(x-3y , x+3y) = \ldots - \ldots$.
   c. Solve I.E $y^2(x) = 25 - 6 \int_2^x y(t)\ dt$.

5) a. P.t F(x) = (x,y) is B.F – L.F – C.F in H.S X .
   b. P.t $Ay(x) = C + \frac{3}{5} \int_0^x y(t)\, dt$ is contra.Op in C [0,1] .

مع أطيب التمنيات بالنجاح .. د .سعيد أحمد أبوالعلا واللجنة

1969	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF MATHEMATICS FINAL EXAM FOR FOURTH LEVEL (MATH STUDENTS)	
	COURSE TITLE: NUMERICAL ANALYSIS (2)	COURSE CODE: MA4109

DATE: 31/12/2014	TERM: FIRST	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS

Answer the following questions:

(I) (a) Find the general solution for the following difference equation:

$$f(x+4) - \frac{5}{4} f(x+3) + \frac{5}{2} f(x+1) - f(x) = 1 \;;$$
$$f(0) = 0\,, f(1) = 11\,, f(2) = -8\,, f(3) = 6\;.$$ **(20 marks)**

(b) Discuss the stability for the following numerical procedure with respect to its initial values:

$$y_n - y_{n-3} = \frac{3h}{8}[\,f(x_{n-3}, y_{n-3}) + 3f(x_{n-2}, y_{n-2}) + 3f(x_{n-1}, y_{n-1})\,], n \geq 3.$$ **(20 marks)**

(II) (a) Apply the method of nets to compute the numerical solutions for the following mixed problem: $\frac{\partial^2 u}{\partial t^2} - \frac{\partial^2 u}{\partial x^2} = t + x - 1,$

$$u(x,0) = ln(3-x),\ \frac{\partial u(x,0)}{\partial t} = 0\ \ (0 \leq x \leq 1);$$
$$u(0,t) = ln3,\ u(1,t) = ln2,\ h = 0.05\,.$$ **(20 marks)**

(b) By the method of finite differences, find the numerical solutions for the following linear boundary value problem:

$$y'' + (1+x^2)y' - xy = 0\,,\ \ x \in [0\,, 1.5];\ y(1) = 0,\ \ y(1.5) = 1.62\,, h = 0.01\;.$$ **(15 marks)**

(III) (a) Define: An interior nodal point - The collocation points - The iterated and the degenerate kernels - The Dirichlet problem. **(15 marks)**

(b) Find an approximate solution for the following Fredholm's integral equation:

$$x(t) = t^2 - 2 + \int_0^1 (s+1)\, e^{-ts^2}\, x(s)\, ds\ , t \in [0,1].$$ **(20 marks)**

(IV) (a) Making use the collocation method, derive an approximate analytical solution for the following boundary value problem:

$$x^2 y'' - xy' + 2y = x^2\,,\ \ x \in [-1\,, 0];\ y(-1) = y(0) = 0\,.$$ **(20 marks)**

(b) Define ill and well conditioned problems and whence discuss the stability of the following initial value problem with respect to its initial condition:

$$y'(x) = -[y(x)]^2\,,\ 0 \leq x \leq b\ ;\ y(0) = 1\,.$$ **(20 marks)**

EXAMINERS	PROF. DR. A. R. M. EL-NAMOURY	DR. M. A. SERWAH

With our best wishes

جامعة طنطا امتحان الفصل الدراسي الأول المستوى الثالث-علوم الحاسب

كلية العلوم ٢٠١٤-٢٠١٥ المادة:توبولوجي وجبرحديث

(MA4121)

قسم الرياضيات الزمن:ساعتان

Modern Algebra.

Answer the following:

1- Show that Z[x], the set of all polynomials in an indeterminate x with integral coefficients, is a commutative ring with no zero divisors. (10 marks).

2- Let φ: (C ; +, .) → $(M_2(R))$;+ ,.)

a+ib→ $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$ be a map from the field of complex numbers into the ring of all square matrices of degree 2 with real entries. Show that φ is a ring homomorphism. Find the kernel of φ . Is φ onto?.(10 marks).

3- Prove that if φ is a ring homomorphism, then kerφ is an ideal. (10 marks).

4- Determine all ideals that contain the integer 6, and those that contain the integer 8, then deduce the ideal generated by the two integers {6,8} . (10 marks).

5- Find out the zeros of the polynomial $x^4 + 4x^3$+ 6x+2x+3 ∈ Z_8 [x],then factorize the polynomial as a product of two polynomials of less degrees. (10 marks).

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