KABARAK UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: MATH 314

COURSE TITLE: NUMERICAL ANALYSIS 1

STREAM: SESSION VI & VII

DAY: MONDAY

TIME: 2.00 – 4.00 P.M.

DATE: 06/04/2009

INSTRUCTIONS:

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

a. The following table gives the values of y which a polynomial of degree 5. It is known that y = f(3) has an error. Correct the error.

x:	0	1	2	3	4	5	6
y:	1	2	33	254	1025	3126	7777

(4 marks)

b. In a triangle ABC. A=6 cm, c=15 cm, $\angle B = 90^0$. Find the possible error in the computed value of A, if the errors in the measurements of a and c are 1mm and 2mm respectively. (5 marks)

c. Prove that: Δ [f(x)g(x)]=f(x+h) Δ g(x)+g(x) Δ f(x) (4 marks)

d. Use Newton's Backward formula to find y(-1) if y(0) = 2, y(1) = 9, y(2) = 28, y(3) = 65, y(4) = 126, y(5) = 217. (5 marks)

e. Find the value of $[\frac{\Delta^2}{E}]e^x.\frac{Ee^x}{\Delta^2 e^x}$. Take h =1 (4 marks)

f. Proof the following:

(i) $\nabla\Delta = \Delta - \nabla = \delta^2$ (4 marks)

g. Given the following function values, find a second degree Lagrange interpolation.

$x_0 = -2,\ \mathrm{y}_0 = -8.52, x_1 = 1,\ \mathrm{y}_1 = 3.00, x_2 = 2,\ \mathrm{y}_2 = 7.48$ (4 marks)

QUESTION TWO (20 MARKS)

a. Evaluate the following:

(i) $(\frac{\Delta^2}{E})\,\mathrm{x}^3$ (4 marks)

(ii) $(E^{-1}\Delta)x^3$ (3 marks)

(iii) $(\nabla + \Delta)^2 (x^2 + x + 1)$ (5 marks)

(iv) If $x_0 = 3, x_1 = 12, x_2 = 81, x_3 = 200, x_4 = 100, x_5 = 8,$ find the vaue of $\Delta^5 x_0$ (3 marks)

b. Find the cubic polynomial from the data below:

x:	0	1	2	3	4
y:	-5	-10	-9	4	35

(5 marks)

QUESTION THREE (20 MARKS)

a. The following table gives the population of a certain country. Find the population in the year 2001 using the Advancing difference formula:

Year	1941	1951	1961	1971
Population(in millions)	352	405	473	554

(5 marks)

b. Use the table below to find f(0.36) using Bessel's formula.

x:	0.1	0.2	0.3	0.4	0.5	0.6
f(x):	1.172	1.008	0.878	0.782	0.720	0.692

(5 marks)

c. Given the following tabulated function:

x:	1.0	2.0	3.0	4.0
f(x) :	150	36.75	17.33	9.19

Use Newton's Backward interpolation formula to evaluate f(5.0) (5 marks)

d. Find the missing term:

x:	7	9	11	13	15	17
y:	32	78	-	144	257	381

(5 marks)

QUESTION 4 (20 MARKS)

a. Use Stirling's formula to calculate $f^1(2)$ from the table below:

x:	1.7	1.8	1.9	2.0	2.1	2.2	2.3
f(x):	0.58824	0.55556	0.52632	0.50000	0.47619	0.45455	0.41667

(6 marks)

b. From the following table, calculate:

(1) $\int_0^1 f(x)dx$ (2) $\int_0^2 f(x)dx$ (3) $\int_2^3 f(x)dx$

x:	`0	1	2	3	4	5	6	7	8	9	10
f(x):	1.0	0.9514	0.9182	0.8975	0.8873	0.8862	0.8935	0.9086	0.9314	0.9618	1.0

(9 marks)

c. From the following data, estimate $\int_0^2 y(x)dx$ using simpson's three – eigth rule

x:	0	.25	.50	.75	1.00	1.25	1.50	1.75	2
y:	1.000	1.284	1.649	2.117	2.718	3.490	4.482	5.755	7.389

(5 marks)

QUESTION 5 (20 MARKS)

a. Assuming that a root of $f(x) = x^3 - 9x + 1$ lies in the interval (2, 4), find that root by Newton Raphson method. (5 marks)

b. Solve $e^x - 3x = 0$ by iterative method (5 marks)

c. Find a real root of the equation cos x = 3x – 1 correct to 4 decimal places by iteration method (5 marks)

e. Find f(x) from the table below. Also find f (7). (5 marks)

x :	0	1	2	3	4	5	6
f(x):	-1	3	19	53	111	199	323