Computer Sciences
University of Technology

Date: 24/5/2012
Time: 3 hours
Lecturer: Ayad Hazim

Final Exam. 2011-2012
Term

Subject: **Mathematics**
Class: **1st class**
Branch: **All Branches**

Notes: - Answer **Only Four** Questions

15 marks for each question

Q: 1

If $A=\begin{pmatrix} 1 & 2 & 2 \\ 0 & 1 & 1 \\ -1 & -2 & 0 \end{pmatrix}$ and $B=\begin{pmatrix} 0 & 2 & 4 \\ -1 & -3 & 2 \\ 1 & 2 & 0 \end{pmatrix}$, Find the inverse of the matrix A*B if it exists.

Q: 2

A- Determine the following limits without using L'Hopital's Rule (Answer **three** only)

1- $\lim_{x\to\infty} f(x)$, if $\frac{2X+3}{X} \le f(x) \le \frac{2x^2+5X}{X^2}$.

2- $\lim_{x\to\infty} \frac{\cos(2x)-1}{\cos x-1}$.

3- $\lim_{x\to 0} \frac{tan3x}{sin8x}$.

4- $\lim_{X\to 0} (\frac{\sin(\sin(X)}{X})$

B- Graph the following functions (Answer **one** only)

1- $G(X)=\begin{bmatrix} 3-X, & X>0 \\ 2X, & 0\le X \end{bmatrix}$

2- $F(X)=\begin{bmatrix} \frac{1}{X}, & X>0 \\ X, & 0\le X \end{bmatrix}$.

Q:3

A- find $\frac{dy}{dx}$ of the following functions :

1- $y=\frac{\sin^{-1}(e^{-x^2})*\cos^{-1}(e^{x^2+\sqrt{x}})}{\tan^{-1}(e^{2x})}$

2- $y=\ln(\tanh^{-1}(\sqrt{2x})*\ln(\sinh^2(2x)))$.

3- $y=2^{x^2+e^x}*3\sin(\ln(2x+1))$.

B- Discuss and sketch the function $f(x)=(X+\frac{1}{X})$.

Turn the page please

Q:4

A- Find the fourth Maclaurin polynomial for f (x) = sin 2X.

B- Find all maxima and minima of the function f(x) $=e^{sinx}$ for $-\pi \leq X \leq 2\pi$

Q:5

A- Evaluate the following integrals (Answer **three** only)

1- $I = \int_0^{\frac{1}{\sqrt{2}}} \frac{X}{\sqrt{1-x^4}}\, dx$.

2- $I = \int \frac{\sqrt{X^2-7}}{X}\, dx.$

3- $I = \int X^2 e^X dx.$

4- $I = \int \frac{X^2+3X+3}{X^3-X}\, dx$.

5- $I = \int \frac{1}{\sqrt[3]{X2}+\sqrt{X}} dx$

Good Luck