International Institute for
Technology and Management

November 23 ,2008 **Duration :1 hr**

Unit 05a: Mathematics 1 – (MathB) **Assignment – 2**

1. Determine the derivatives of the following functions : **(18 Marks)**

a. $y = (3e^{2x} - \cos x)(\sin x - 3)^2$ b. $y = \dfrac{\sqrt{1+x^2}}{1+e^x}$

c. $y = \ln\left(\dfrac{e^x - 1}{e^x + 1}\right)$ d. $y = \left(x^2 + \dfrac{1}{x}\right)[5 + \ln(x + e^x)]$

e. $y = \dfrac{\sin x}{1 - \cos x}$ f. $y = (x^2 - x + 3)e^{\frac{-x^2}{2}}$

2. Find all stationary points of the following functions and determine whether they are maxima,minima or inflection points: **(12 Marks)**

a. $y = 3x^5 - 25x^3 + 60x$ b. $y = (x^2 - x - 1)e^{-x}$

c. $y = \dfrac{\ln x}{x^2}$ **, defined for x > 0**

3. Evaluate the following integrals: **(12 Marks)**

a. $\int \dfrac{\sqrt{1 - \ln x}}{x} dx$ **b.** $\int \dfrac{3x - 3}{x^2 - 2x + 3} dx$

c. $\int \sin x \cos^3 x dx$ **d.** $\int \dfrac{dx}{e^x(e^{-x} + 1)^2}$

4. A firm's marginal cost function is: **(8 Marks)**

$\dfrac{20}{\sqrt{q}} e^{\sqrt{q}} + 3q^2 + \dfrac{q}{(q^2 + 1)^2}$ and the cost of producing 4 units is 20.

Determine the total cost function.

END of QUESTIONS