Mathematics : Mid-Term Exam Autumn 2016 Time: 1 Hour 20 Marks

[1]Find y` :

(a) $y = 2x^4 + x^{-4} - 4$ (b) $y = \log x + \ln x$

(c) $y = (2x + \cos x)^5$ (d) $y = \frac{\sin x}{x^5}$

[2]Find the extrema of the function : $f(x) = x^3 - 3x^2$

[3]Find the integrals:

(a) $\int (3^x - \sin 3x)\, dx$ (b) $\int (x^4 + \cos x)\, dx$ (c) $\int (\frac{1}{x} - \frac{3}{x+5})\, dx$

(d) $\int (x^2 - 3)^2\, dx$ (e) $\int \frac{x}{x^2-4x+3}\, dx$ (f) $\int_0^1 (3^x + 1)^2\, dx$

[4]If y is the quantity of a drug in the blood decreases according to : $\frac{dy}{dt} = -\sqrt{y}$.

Find y as function of the time t where the initial quantity is 16 units.

Find (i)The value of y after 2 hours.

(ii)The time at which there exists 25 % of drug in the blood.

(iii)The time at which there is no drug in the blood.

Good Luck *Dr. Mohamed Eid*