Midterm 2 (24/11/2015)
Answer the following questions

Question 1. (8=5+3) marks

a) Find the first derivative of each the following functions:

[1] $y = 4^{x^2+x+1} + e^{\sin x}$,

[2] $y = \tan^{-1}(x^3) - 4\cos^{-1}(x^2)$,

[3] $y = \ln(x^2 \sec x)$.

b) Find the value of the constant c which satisfies the mean value theorem for the function $f(x) = x^4 - 4x + 10$ on the closed interval $[-1, 1]$.

Question 2. (7=4+3) marks

a) Evaluate the following limits:

(i) $\displaystyle\lim_{x \to 1} \frac{\ln x}{x - 1}$

(ii) $\displaystyle\lim_{x \to \infty} \frac{e^x + \ln 4x}{x^2}$

b) Use the implicit differentiation to determine the equation of the tangent line of the function y, defined by the equation $x^2 + y^3 - 2y = 8$ at the point $(3, 1)$.

Question 3. (5=2.5+2.5) marks

a) Prove that 2 and -1 are the critical points of the function $f(x) = 2x^3 - 3x^2 - 12x$.

b) Deduce the values of absolute extrema (minimum and maximum) of $f(x)$ on the closed interval $[-2, 4]$.

BEST WISHES