1St Year- Survey. Eng. Mid-Term Exam – Math (A) 1 Hour (November 2009)

(1)Test the series: (a) $\sum_{n=1}^{\infty}(n+\frac{1}{n})$ (b) $\sum_{n=1}^{\infty}\frac{(-1)^n}{n^5+n^2}$

(2) If $u=\cos^{-1}(\frac{x^2+y^2}{2x+y})$. Show that: $xu_x+yu_y=-\cot u$

(3)Find the extrema of the function f(x, y) = $2x^2-y^2+y(x+1)$ subject to $2x+3y=2$

(4)Solve the differential equations: (a) $y`-y=e^x.\sqrt{y}$ (b) $y`=-\frac{x+\sin y}{2+x\cos y}$

(5)Show that the orthogonal trajectories of the curves $x^2+2y^2=a$ are the curves $y=bx^2$

Good Luck *Dr. Mohamed H. Eid*