

**MAT123-04 MATHEMATICS I 2nd MIDTERM EXAM  
QUESTION SHEET**

Name : \_\_\_\_\_

No : \_\_\_\_\_

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**Q.1.** Find the tangent line to the curve

$$e^y \cos x = 1 + \sin(xy)$$

at the origin.

**Q.2.** Two sides of a triangle have lengths  $\sqrt{21}$  m and  $\sqrt{7}$  m. The angle between them is increasing at a rate of  $2/\sqrt{3}$  rad/sec. How fast is the altitude of the triangle decreasing when the angle between the sides of fixed length is  $5\pi/6$  radians?

**Q.3.** Evaluate the following limits.

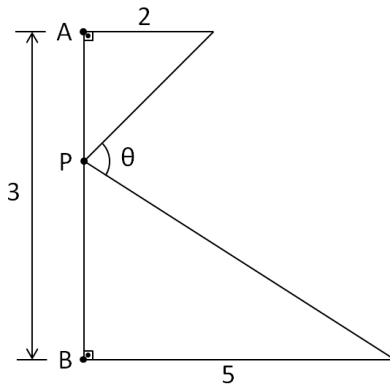
(a)  $\lim_{x \rightarrow 0^-} \frac{e^{1/x}}{x^2}$

(b)  $\lim_{x \rightarrow (\pi/2)^-} (\tan x)^{\cos x}$

**Q.4.** Identifying the domain and all asymptotes, investigating all critical points, intervals where the curve is increasing and where it is decreasing, points of inflections and the concavity of the curve, sketch the curve

$$y = \frac{1}{x} e^{-1/x}.$$

**Q.5.**



Where should the point **P** be chosen on the line segment **AB** so as to maximize the angle  $\theta$ ?

GOOD LUCK