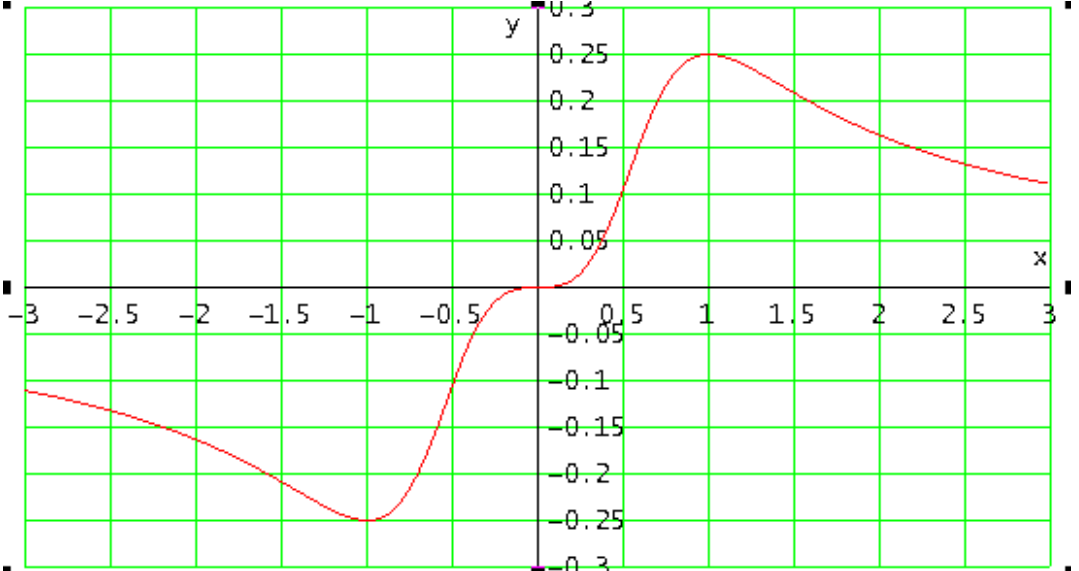**ANSWERS TO SEMESTER ONE EXAMINATION JUNE 2009 (JANUARY 2009 INTAKE)**

| 1 | $\mathbf{r} = \begin{pmatrix} 9 \\ 4 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} -4 \\ -1 \\ 1 \end{pmatrix}$ |
|---|---|
| 2 | 52757173 |
| 3 | PROVE |
| 4 | i) $\mathbf{r} = \begin{pmatrix} 0 \\ 9 \\ 11 \end{pmatrix} + \lambda \begin{pmatrix} 9 \\ -4 \\ 5 \end{pmatrix}$    ii) $\dfrac{83}{\sqrt{483}}$    iii) $5x + 2y - 8z = 1$ |
| 5 | $\dfrac{dy}{dx} = \dfrac{3x^2\left(1 - x^4\right)}{\left(1 + 3x^4\right)^2}$ <br><br> $\left(-1, \dfrac{-1}{4}\right)$ minimum point  ;   $(0,0)$ inflexion point  ;   $\left(1, \dfrac{1}{4}\right)$ maximum point <br><br> Asymptotes : $y = 0$. <br><br> The curve crosses the axes at points : $(0,0)$. <br><br>  |
| 6 | $S_2 = 1$  ;   $8y^3 - 100y^2 + 189y - 729 = 0$  ;   $S_3 = \dfrac{25}{2}$  ;   $S_6 = 109$  ;   $S_{-3} = \dfrac{7}{27}$ |