# S.S.S. 2 FURTHER MATH HOLIDAY ASSIGNMENT

1. Find the equations of tangent and normal to the curve $x^2 + y^2 = 1$ at point $\left(1, \frac{\sqrt{3}}{2}\right)$.
2. If $\alpha$ and $\beta$ are the roots of the equation $2x^2 - 7x + 4 = 0$, find the equation whose roots are $\frac{\alpha + 1}{\beta}$ and $\frac{\beta + 1}{\alpha}$.
3. The instataneous displacement of a particle is given by $x = \ln cos 2\text{t} - e^{\ln sint} + t$.

   If $\boldsymbol{t = \pi}$ **seconds**, find the exact values of its:

   $(a)$ displacement: $x$

   $(b)$ acceleration: $\frac{d^2x}{dt^2}$.
4. The position vector of a particle of mass $3Kg$ moving along a space curve at any time $\boldsymbol{t}$ seconds is given by $\boldsymbol{r} = (4t^3 - t^2)\boldsymbol{i} + (t - 2t^2)\boldsymbol{j}$; find the:

   $(a)$ velocity $\frac{dr}{dt}$ of the body;

   $(b)$ acceleration $\frac{d^2r}{dt^2}$ of the body;

   $(c)$ the magnitude of the force acting on the body $\boldsymbol{t} = 2s$, correct to 4 sf.

5. The position vector of a body, with respect to the origin, is given by $\boldsymbol{r} = 4t\boldsymbol{i} + (12 - 3t^2)\boldsymbol{j}$ at any time $t$ $seconds$. If $t = 1$ $second$, find, the:

   $(a)$ exact magnitude of the displacement of the body;

   $(b)$ velocity $\frac{dr}{dt}$ of the body;

   (c) exact magnitude of velocity of the body in its simplest form.