WEEK 7 – Tutorial 1

Tangents and Normals

1. Find the equation of the tangent and normal to the following curves at the points named.

   (a) $y = 2x^2 - x$ at $(2, 6)$ (b) $y = x^3 - 2x^2$ at $(1, -1)$ (c) $y = \frac{12}{x}$ at $x = 3$

2. Find the equation of the tangent to $y = 2x^3 + 3x - 1$ at $(1, -1)$.

3. Find the equations of the tangents to $y = x(x-1)$ at the point where the curve cuts the x-axis.

4. Find the equation of the normal to the curve $y = x^2$ at the point (2, 4). At what point does the normal cut the y-axis.

5. Find the equation of the tangent to the graphs of the given functions at the given points.

   (a) $f(x) = (1-x)(x^2-1)^2$, $(2, -9)$ (b) $f(x) = \frac{8}{\sqrt{x^2+6x}}$, $(2, -2)$

   (c) $f(x) = x\sqrt{2x^2+7}$, $(3, 15)$ (d) $f(x) = \left(\frac{x+1}{x-1}\right)^2$, $(3, 4)$

6. Find the point on the curve $y = x^3 - 6x^2 + 9x + 1$ at which the tangent is parallel to the line $y = 24x$.

~~7. Find the equation of the tangent to $x^2 + y^2 = xy$ at $P = (-1, +1)$~~

[ANSWERS]

Tangents and Normals

1. (a) $y = 7x - 8$, $y = \frac{-x}{7} + \frac{44}{7}$ (b) $y = -x$, $y = x - 2$ (c) $y = \frac{-4x}{3} + 8$, $y = \frac{3x}{4} + \frac{7}{4}$

2. $y = 9x - 10$

3. $y = -x$, $y = x - 1$

4. $y = \frac{-x}{4} + \frac{18}{4}$; $(0, 4\frac{1}{2})$

5. (a) $y = -33x + 57$

   (b) $y = -\frac{5}{8}x + \frac{3}{4}$

   (c) $y = \frac{43}{5}x - \frac{54}{5}$

   (d) $y = -2x + 10$

6. (5, 21) (-1, -15)

7. $2x - y + 3 = 0$