

Equation of Tangent and Normal

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5:50 PM

Find the equation of the tangent and the normal at the point $x = 3$ on the line $y = x^2$

$$y = x^2$$

Differentiate to find the gradient function

$$y' = 2x$$

Substitute 3 into x

$$y' = 2 \times 3 = 6 \quad \text{the gradient at } x = 3 \text{ is } 6$$

$$y = x^2 = 3^2 = 9$$

equation of tangent line: $y = mx + c$

$$9 = 6 \times 3 + c$$

$$9 = 18 + c$$

$$9 - 18 = c$$

$$-9 = c$$

$$y = 6x - 9$$

equation of the normal: $y = mx + c$

$$m = -\frac{1}{6}$$

$$y = -\frac{1}{6}x + c$$

sub in $x = 3$ $y = 9$

$$9 = -\frac{1}{6} \times 3 + c$$

$$9 = -\frac{3}{6} + c$$

$$9 + \frac{3}{6} = c$$

$$9\frac{1}{2} = c$$

$$y = -\frac{1}{6}x + 9\frac{1}{2}$$