

11.11 Quiz: Tangent and normal lines to a function

Use your own notebook, but no calculators or computers

Find the derivative of each polynomial function

1. $f(x) = x^3 + 3x^2$

$$f'(x) = 3x^2 + 6x$$

2. $g(x) = -x^4 + 3x^3 + 4x - 3$

$$g'(x) = -4x^3 + 9x^2 + 4$$

Evaluate the function and its derivative for a given value of x

3. Given $f(x) = x^3 - 4x^2 + x + 5$

(a) Find $f(1)$

$$\begin{aligned} &= 1^3 - 4(1^2) + (1) + 5 \\ &= 3 \end{aligned}$$

(b) Find $f'(1)$

$$\begin{aligned} f'(x) &= 3x^2 - 8x + 1 \\ f'(1) &= 3(1^2) - 8(1) + 1 \\ &= -4 \end{aligned}$$

4. The graph shows the polynomial function $y = x^3 - 2x^2 - 2x + 1$. Its derivative is $\frac{dy}{dx} = 3x^2 - 4x - 2$.

(a) Write down the coordinates of the point P .

$$(1, -2)$$

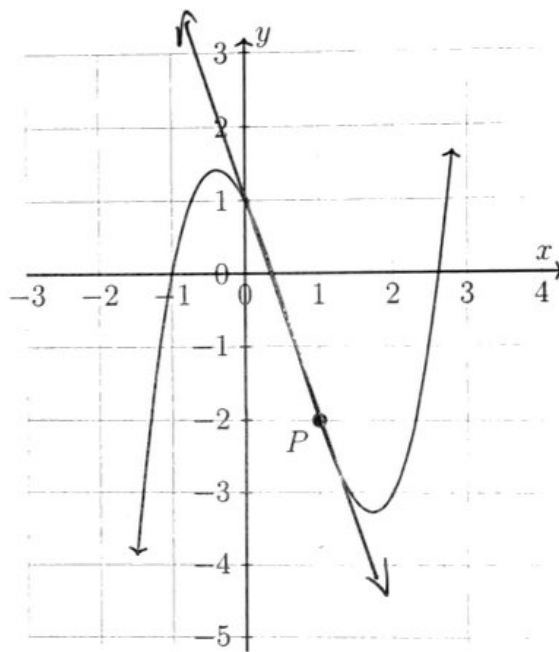
(b) Find the slope of the tangent line at P .

$$\frac{dy}{dx} \bigg|_{x=1} = 3(1^2) - 4(1) - 2 = -3$$

(c) Write down the equation of the tangent line at P .

$$y - (-2) = -3(x - 1)$$

(d) Draw the tangent line on the graph accurately with a straight edge.



5. The function $y = -x^2 - 3x + 2$ is graphed on the grid below. Find its derivative and the equations of the tangent and normal lines through point $(-3, 2)$. Draw the lines.

$$y' = -2x - 3 \quad x = -3$$

$$= -2(-3) - 3$$

$$= 3$$

tangent line:

$$y - 2 = 3(x + 3)$$

normal

$$y - 2 = -\frac{1}{3}(x + 3)$$

