

GRADE 12

Calculus –Equations of Tangents to Graphs of Functions 17 July 2020

WEBSITE NOTES ANSWERS

TOPIC:

- Equations of tangents to graphs of functions.

Remember that a Tangent is a straight line and therefore has the equation $y=mx+c$. To work out the gradient you will need to work out the derivative first.

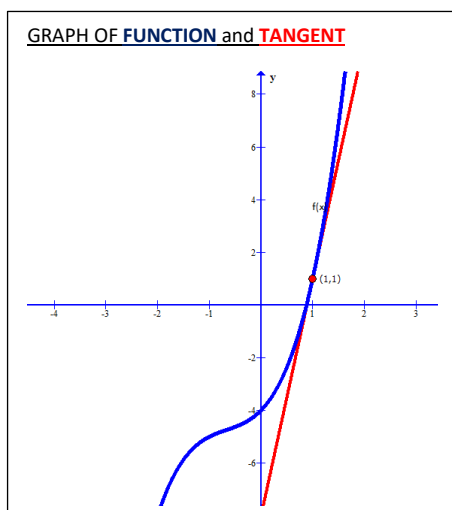
Example 2

Try the following on your own

$$\text{Given } f(x) = x^3 + 2x^2 + 2x - 4$$

Determine the equation of the tangent at the point S (1; 1) in the form of $y=.....$

Answer



$$\begin{aligned} f'(x) &= 3x^2 + 4x + 2 \\ f'(1) &= 3 \cdot (1)^2 + 4 \cdot (1) + 2 = 9 \\ y - y_1 &= m(x - x_1) \\ y - (1) &= 9 \cdot (x - (1)) \\ y - 1 &= 9x - 9 \\ y &= 9x - 9 + 1 \\ \mathbf{y} &= \mathbf{9x - 8} \end{aligned}$$

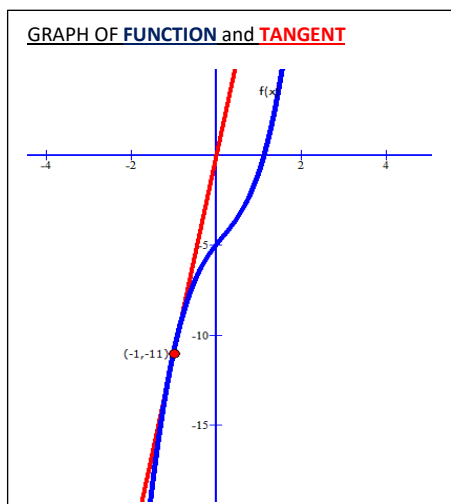
Example 3

Try the following on your own

$$\text{Given } f(x) = 2x^3 - x^2 + 3x - 5$$

Determine the equation of the tangent at the point S (-1; -11) in the form of $y=.....$

Answer



$$\begin{aligned} f'(x) &= 6x^2 - 2x + 3 \\ f'(-1) &= 6 \cdot (-1)^2 - 2 \cdot (-1) + 3 = 11 \\ y - y_1 &= m(x - x_1) \\ y - (-11) &= 11 \cdot (x - (-1)) \\ y + 11 &= 11 \cdot (x + 1) \\ y + 11 &= 11x + 11 \\ y &= 11x + 11 - 11 \\ \mathbf{y} &= \mathbf{11x} \end{aligned}$$

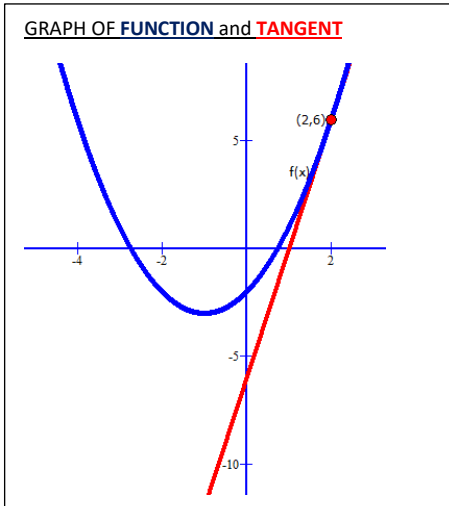
Example 4

Try the following on your own

Given $f(x) = x^2 + 2x - 2$

Determine the equation of the tangent at the point S (2; 6) in the form of $y = \dots\dots$

Answer



$$\begin{aligned} f'(x) &= 2x + 2 \\ f'(2) &= 2 \cdot (2) + 2 = 6 \\ y - (6) &= 6 \cdot (x - (2)) \\ y - 6 &= 6x - 12 \\ \mathbf{y} &= \mathbf{6x - 6} \end{aligned}$$