

Answer on Question #63931 – Math – Calculus

Question

Find the equation of the line tangent to the curve $y = 3x^2 - 4x$ and parallel to the line

$$x - 2y + 6 = 0$$

Solution

$$x - 2y + 6 = 0 \rightarrow y = \frac{1}{2}x + 3.$$

Thus, the slope of the tangent line is $m = \frac{1}{2}$.

Using the equation of the curve $y = 3x^2 - 4x$ compute

$$y' = (3x^2 - 4x)' = 3 \cdot 2x - 4 = 6x - 4.$$

We need to find the point $(x_0; y_0)$ so that $y'(x_0) = \frac{1}{2}$.

$$6x_0 - 4 = \frac{1}{2} \rightarrow x_0 = \frac{3}{4}.$$

$$y_0 = 3 \cdot \left(\frac{3}{4}\right)^2 - 4 \cdot \frac{3}{4} = -\frac{21}{16}.$$

Now using the point - slope form of the line we can find the equation of the tangent line:

$$y - y_0 = m(x - x_0)$$

$$y + \frac{21}{16} = \frac{1}{2}\left(x - \frac{3}{4}\right)$$

The equation of tangent line is

$$y = \frac{1}{2}x - \frac{27}{16}.$$

Answer: $y = \frac{1}{2}x - \frac{27}{16}$.