

Tangent Line at a Point

Find the exact equation of the tangent line at the given point on the curve.

1.

$$f(x) = \frac{-3 \cdot x^2}{-2 \cdot x + 1}$$

at $x = 0$

Find the tangent line.

2.

$$f(x) = 3 \cdot \sin(2 \cdot x) + 2$$

at $x = \frac{5}{8} \cdot \pi$

Find the tangent line.

3.

$$f(x) = 3 \cdot x^2 + 3$$

at $x = 0$

Find the tangent line.

4.

$$f(x) = -2 \cdot e^x + 1$$

at $x = 2$

Find the tangent line.

5.

$$f(x) = \frac{-3 \cdot x + 2 \cdot x^2 - x^3 + \frac{1}{2}}{-x + \frac{1}{2}}$$

at $x = 0$

Find the tangent line.

6.

$$f(x) = -\sec(-1 \cdot x) - 2$$

at $x = \frac{-5}{3} \cdot \pi$

Find the tangent line.

Tangent Line at a Point

Find the exact equation of the tangent line at the given point on the curve.

7.

$$f(x) = 3 \cdot x + 2 \cdot x^2 - 2$$

$$\text{at } x = -2$$

Find the tangent line.

8.

$$f(x) = \left(2\right)^{\frac{1}{2} \cdot x + 2}$$

$$\text{at } x = 0$$

Find the tangent line.

Tangent Line at a Point

Answer Key

Find the exact equation of the tangent line at the given point on the curve.

1.
$$f(x) = \frac{-3 \cdot x^2}{-2 \cdot x + 1}$$

$$f'(x) = \frac{-6 \cdot x \cdot (-2 \cdot x + 1) - 6 \cdot x^2}{(-2 \cdot x + 1)^2}$$

$$f(x_0) = 0$$

$$f'(x_0) = 0$$

 Tangent: $y = 0$

$-2 \cdot x + 1 \neq 0$ (original denominator).

2.
$$f(x) = 3 \cdot \sin(2 \cdot x) + 2$$

$$f'(x) = 6 \cdot \cos(2 \cdot x)$$

$$f(x_0) = -\frac{3}{2} \cdot \sqrt{2} + 2$$

$$f'(x_0) = -3 \cdot \sqrt{2}$$

 Tangent: $\left(y - \left(-\frac{3}{2} \cdot \sqrt{2} + 2\right)\right) = -3 \cdot \sqrt{2} \left(x - \frac{5}{8} \cdot \pi\right)$

All real x .

3.
$$f(x) = 3 \cdot x^2 + 3$$

$$f'(x) = 6 \cdot x$$

$$f(x_0) = 3$$

$$f'(x_0) = 0$$

 Tangent: $y = 3$

All real x .

4.
$$f(x) = -2 \cdot e^x + 1$$

$$f'(x) = -2 \cdot e^x$$

$$f(x_0) = -2 \cdot e^2 + 1$$

$$f'(x_0) = -2 \cdot e^2$$

 Tangent: $\left(y - (-2 \cdot e^2 + 1)\right) = -2 \cdot e^2 (x - 2)$

All real x .

5.
$$f(x) = \frac{-3 \cdot x + 2 \cdot x^2 - x^3 + \frac{1}{2}}{-x + \frac{1}{2}}$$

$$f'(x) = \frac{\left(4 \cdot x - 3 \cdot x^2 - 3\right) \left(-x + \frac{1}{2}\right) - 3 \cdot x + 2 \cdot x^2 - x^3 + \frac{1}{2}}{\left(-x + \frac{1}{2}\right)^2}$$

$$f(x_0) = 1$$

$$f'(x_0) = -4$$

 Tangent: $(y - 1) = -4 (x - 0)$

$-1 \cdot x + 1/2 \neq 0$ (original denominator).

6.
$$f(x) = -\sec(-1 \cdot x) - 2$$

$$f'(x) = \sec(-1 \cdot x) \cdot \tan(-1 \cdot x)$$

$$f(x_0) = -4$$

$$f'(x_0) = -2 \cdot \sqrt{3}$$

 Tangent: $(y + 4) = -2 \cdot \sqrt{3} \left(x + \frac{5}{3} \cdot \pi\right)$

$\cos(-1 \cdot x) \neq 0$.

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Answer Key

Find the exact equation of the tangent line at the given point on the curve.

7. $f(x) = 3 \cdot x + 2 \cdot x^2 - 2$
 $f'(x) = 4 \cdot x + 3$
 $f(x_0) = 0$
 $f'(x_0) = -5$
Tangent: $(y - 0) = -5 (x + 2)$

All real x .

8. $f(x) = (2)^{\frac{1}{2} \cdot x + 2}$
 $f'(x) = \frac{1}{2} \cdot \ln(2) (2)^{\frac{1}{2} \cdot x + 2}$
 $f(x_0) = 4$
 $f'(x_0) = 2 \cdot \ln(2)$
Tangent: $(y - 4) = 2 \cdot \ln(2) (x - 0)$

All real x .