

## Calculus Practice: Using Differentiation to Find a Tangent 3a

For each problem, find the points where the tangent line to the function is horizontal. Indicate if no horizontal tangent line exists.

1)  $y = -\frac{x^2}{2} - 2x - 4$

- A)  $(-2, -2)$   
 B) No horizontal tangent line exists.  
 C)  $(-3, -\frac{5}{2})$   
 D)  $(-1, -\frac{5}{2})$

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

- A)  $(-1, -3)$   
 B) No horizontal tangent line exists.  
 C)  $(0, -\frac{3}{2})$   
 D)  $(1, -1)$

3)  $f(x) = -2x^2 - 8x - 3$

- A)  $(0, -3)$   
 B)  $(-2, 5)$   
 C)  $(-1, 3)$   
 D) No horizontal tangent line exists.

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

- A)  $(1, 1)$   
 B) No horizontal tangent line exists.  
 C)  $(-1, 3)$   
 D)  $(0, \frac{3}{2})$

5)  $y = -\frac{5}{x^2 + 5}$

- A)  $(-1, -\frac{5}{6})$   
 B)  $(2, -\frac{5}{9})$   
 C) No horizontal tangent line exists.  
 D)  $(0, -1)$

6)  $y = \ln(-x + 2)$

- A)  $(-1, \ln 3)$   
 B)  $(0, \ln 2)$   
 C)  $(-5, \ln 7)$   
 D) No horizontal tangent line exists.

7)  $y = x^3 - 4x^2 + 5x - 4$

- A)  $(1, -2), (2, -2)$   
 B) No horizontal tangent line exists.  
 C)  $(1, -2), (\frac{5}{3}, -\frac{58}{27})$   
 D)  $(0, -4)$

8)  $f(x) = -\frac{2}{x-2}$

- A)  $(-1, \frac{2}{3})$   
 B)  $(-2, \frac{1}{2})$   
 C) No horizontal tangent line exists.  
 D)  $(0, 1)$

9)  $f(x) = -\frac{x^2}{3x-3}$

A)  $\left(2, -\frac{4}{3}\right)$

B)  $(0, 0), \left(2, -\frac{4}{3}\right)$

C) No horizontal tangent line exists.

D)  $\left(-1, \frac{1}{6}\right)$

11)  $f(x) = \frac{x^2}{2x-2}$

A)  $\left(-1, -\frac{1}{4}\right)$

B)  $(0, 0), (2, 2)$

C)  $\left(-1, -\frac{1}{4}\right), (0, 0)$

D) No horizontal tangent line exists.

13)  $y = -(2x+8)^{\frac{1}{3}}$

A)  $(-4, 0)$

B)  $\left(3, -\sqrt[3]{14}\right)$

C)  $\left(-1, -\sqrt[3]{6}\right)$

D) No horizontal tangent line exists.

15)  $y = (2x-4)^{\frac{2}{3}}$

A)  $\left(1, \sqrt[3]{4}\right)$

B) No horizontal tangent line exists.

C)  $\left(-1, \sqrt[3]{36}\right)$

D)  $(2, 0)$

17)  $y = 2\sec(x); [-\pi, \pi]$

A)  $(-\pi, 1), (0, -1), (\pi, 1)$

B)  $(-\pi, -2), (0, 2), (\pi, -2)$

C) No horizontal tangent line exists.

D)  $\left(-\frac{\pi}{2}, 2\right), \left(\frac{\pi}{2}, -2\right)$

19)  $f(x) = -(2x-8)^{\frac{2}{3}}$

A)  $(0, -4)$

B) No horizontal tangent line exists.

C)  $\left(2, -2\sqrt[3]{2}\right)$

D)  $\left(1, -\sqrt[3]{36}\right)$

10)  $f(x) = -e^x$

A)  $(1, -e)$

B)  $\left(-2, -\frac{1}{e^2}\right)$

C)  $(2, -e^2)$

D) No horizontal tangent line exists.

12)  $y = -x^3 + 4x^2 - 2$

A)  $(-2, 22), (1, 1)$

B) No horizontal tangent line exists.

C)  $(-1, 3), (0, -2)$

D)  $(0, -2), \left(\frac{8}{3}, \frac{202}{27}\right)$

14)  $y = x^3 - 3x^2 + 4$

A) No horizontal tangent line exists.

B)  $(-1, 0), (1, 2)$

C)  $(-2, -16), (-1, 0)$

D)  $(0, 4), (2, 0)$

16)  $f(x) = x^3 - 3x^2 + 3$

A)  $(0, 3), (1, 1)$

B)  $(0, 3), (2, -1)$

C)  $(-2, -17), (0, 3)$

D) No horizontal tangent line exists.

18)  $f(x) = -\frac{3}{x^2-25}$

A) No horizontal tangent line exists.

B)  $\left(1, \frac{1}{8}\right)$

C)  $\left(-2, \frac{1}{7}\right)$

D)  $\left(0, \frac{3}{25}\right)$

20)  $y = \sin(x); [-\pi, \pi]$

A) No horizontal tangent line exists.

B)  $\left(-\frac{\pi}{2}, -1\right), \left(\frac{\pi}{2}, 1\right)$

C)  $(-\pi, -1), (0, 1), (\pi, -1)$

D)  $(-\pi, -2), (0, 2), (\pi, -2)$

## Calculus Practice: Using Differentiation to Find a Tangent 3a

For each problem, find the points where the tangent line to the function is horizontal. Indicate if no horizontal tangent line exists.

1)  $y = -\frac{x^2}{2} - 2x - 4$

- \*A)  $(-2, -2)$
- B) No horizontal tangent line exists.
- C)  $(-3, -\frac{5}{2})$
- D)  $(-1, -\frac{5}{2})$

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

- A)  $(-1, -3)$
- B) No horizontal tangent line exists.
- C)  $(0, -\frac{3}{2})$
- \*D)  $(1, -1)$

3)  $f(x) = -2x^2 - 8x - 3$

- A)  $(0, -3)$
- \*B)  $(-2, 5)$
- C)  $(-1, 3)$
- D) No horizontal tangent line exists.

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

- \*A)  $(1, 1)$
- B) No horizontal tangent line exists.
- C)  $(-1, 3)$
- D)  $(0, \frac{3}{2})$

5)  $y = -\frac{5}{x^2 + 5}$

- A)  $(-1, -\frac{5}{6})$
- B)  $(2, -\frac{5}{9})$
- C) No horizontal tangent line exists.
- \*D)  $(0, -1)$

6)  $y = \ln(-x + 2)$

- A)  $(-1, \ln 3)$
- B)  $(0, \ln 2)$
- C)  $(-5, \ln 7)$
- \*D) No horizontal tangent line exists.

7)  $y = x^3 - 4x^2 + 5x - 4$

- A)  $(1, -2), (2, -2)$
- B) No horizontal tangent line exists.
- \*C)  $(1, -2), (\frac{5}{3}, -\frac{58}{27})$
- D)  $(0, -4)$

8)  $f(x) = -\frac{2}{x-2}$

- A)  $(-1, \frac{2}{3})$
- B)  $(-2, \frac{1}{2})$
- \*C) No horizontal tangent line exists.
- D)  $(0, 1)$

9)  $f(x) = -\frac{x^2}{3x-3}$

A)  $\left(2, -\frac{4}{3}\right)$

\*B)  $(0, 0), \left(2, -\frac{4}{3}\right)$

C) No horizontal tangent line exists.

D)  $\left(-1, \frac{1}{6}\right)$

11)  $f(x) = \frac{x^2}{2x-2}$

A)  $\left(-1, -\frac{1}{4}\right)$

\*B)  $(0, 0), (2, 2)$

C)  $\left(-1, -\frac{1}{4}\right), (0, 0)$

D) No horizontal tangent line exists.

13)  $y = -(2x+8)^{\frac{1}{3}}$

A)  $(-4, 0)$

B)  $\left(3, -\sqrt[3]{14}\right)$

C)  $\left(-1, -\sqrt[3]{6}\right)$

\*D) No horizontal tangent line exists.

15)  $y = (2x-4)^{\frac{2}{3}}$

A)  $\left(1, \sqrt[3]{4}\right)$

\*B) No horizontal tangent line exists.

C)  $\left(-1, \sqrt[3]{36}\right)$

D)  $(2, 0)$

17)  $y = 2\sec(x); [-\pi, \pi]$

A)  $(-\pi, 1), (0, -1), (\pi, 1)$

\*B)  $(-\pi, -2), (0, 2), (\pi, -2)$

C) No horizontal tangent line exists.

D)  $\left(-\frac{\pi}{2}, 2\right), \left(\frac{\pi}{2}, -2\right)$

19)  $f(x) = -(2x-8)^{\frac{2}{3}}$

A)  $(0, -4)$

\*B) No horizontal tangent line exists.

C)  $\left(2, -2\sqrt[3]{2}\right)$

D)  $\left(1, -\sqrt[3]{36}\right)$

10)  $f(x) = -e^x$

A)  $(1, -e)$

B)  $\left(-2, -\frac{1}{e^2}\right)$

C)  $(2, -e^2)$

\*D) No horizontal tangent line exists.

12)  $y = -x^3 + 4x^2 - 2$

A)  $(-2, 22), (1, 1)$

B) No horizontal tangent line exists.

C)  $(-1, 3), (0, -2)$

\*D)  $(0, -2), \left(\frac{8}{3}, \frac{202}{27}\right)$

14)  $y = x^3 - 3x^2 + 4$

A) No horizontal tangent line exists.

B)  $(-1, 0), (1, 2)$

C)  $(-2, -16), (-1, 0)$

\*D)  $(0, 4), (2, 0)$

16)  $f(x) = x^3 - 3x^2 + 3$

A)  $(0, 3), (1, 1)$

\*B)  $(0, 3), (2, -1)$

C)  $(-2, -17), (0, 3)$

D) No horizontal tangent line exists.

18)  $f(x) = -\frac{3}{x^2-25}$

A) No horizontal tangent line exists.

B)  $\left(1, \frac{1}{8}\right)$

C)  $\left(-2, \frac{1}{7}\right)$

\*D)  $\left(0, \frac{3}{25}\right)$

20)  $y = \sin(x); [-\pi, \pi]$

A) No horizontal tangent line exists.

\*B)  $\left(-\frac{\pi}{2}, -1\right), \left(\frac{\pi}{2}, 1\right)$

C)  $(-\pi, -1), (0, 1), (\pi, -1)$

D)  $(-\pi, -2), (0, 2), (\pi, -2)$