1. (1 point) Let $f(x) = 2x+8$. Then according to the definition of derivative
$f'(x) = \lim_{h\to 0}$ ______________________________
(Your answer above will involve both h and x.)
Taking the limit of this expression gives us
$f'(x) =$ ______________
(Example 4 on page 496 is similar.)
Answer(s) submitted:

-
-

(incorrect)

---

2. (1 point) Let $f(x) = 4x^2+3x+8$. Then according to the definition of derivative
$f'(x) = \lim_{h\to 0}$ ______________________________
(Your answer above will involve both h and x.)
Taking the limit of this expression gives us
$f'(x) =$ ______________
(Example 2 on page 495 is similar.)
Answer(s) submitted:

-
-

(incorrect)

---

3. (1 point) Let $f(x) = 3x^2-5x-4$. Then according to the definition of derivative
$f'(x) = \lim_{h\to 0}$ ______________________________
(Your answer above will involve both h and x.)
Taking the limit of this expression gives us
$f'(x) =$ ______________
Answer(s) submitted:

-
-

(incorrect)

---

4. (1 point) Let $f(x) = 10$. Use the definition of derivative to find $f'(x)$.
$f'(x) =$ _________
Answer(s) submitted:

-

(incorrect)

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5. (1 point) If the tangent line to $y = f(x)$ at $(2,-4)$ passes through the point $(1,-9)$, find
A. $f(2) =$ _________
B. $f'(2) =$ _________
Answer(s) submitted:

-
-

(incorrect)

$$\boxed{\circ\ f'(x) = \frac{d}{dx}(f(x)) = \lim_{h \to 0} \frac{f(x+h) - f(h)}{h}}$$

General Equation to Calculate Derivatives

1. $f(x) = 2x+8$

$$\circ\ f'(x) = \frac{f(x+h) - f(h)}{h}$$

$$\Rightarrow \begin{cases} f(x+h) = 2(x+h)+8 = 2x+2h+8 \\ f(x) = 2x+8 \end{cases}$$

$$= \lim_{h \to 0} \frac{(2x+2h+8) - (2x+8)}{h}$$

$$= \lim_{h \to 0} \frac{2h}{h}$$

$$= \lim_{h \to 0} 2$$

$$= 2$$

2. $f(x) = 4x^2 + 3x + 8$

$$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$f(x+h) = 4(x+h)^2 + 3(x+h) + 8$$

$$= 4(x^2 + 2xh + h^2) + 3(x+h) + 8$$

$$= 4x^2 + 8xh + 4h^2 + 3x + 3h + 8$$

$$= 4x^2 + 3x + 8xh + 4h^2 + 3h + 8$$

$$\rightarrow \lim_{h \to 0} \frac{(\cancel{4x^2} \cancel{+3x} + 8xh + 4h^2 + 3h \cancel{+8}) - (\cancel{4x^2} \cancel{+3x} \cancel{+8})}{h}$$

$$= \lim_{h \to 0} \frac{4h^2 + 8xh + 3h}{h}$$

$$= \lim_{h \to 0} \frac{\cancel{h}(4h + 8x + 3)}{\cancel{h}}$$

$$= \lim_{h \to 0} (4h + 8x + 3)$$

$$= \lim_{h \to 0} (4h) + \lim_{h \to 0} (8x) + \lim_{h \to 0} (3)$$

$$= 0 + 8x + 3$$

$$\therefore f'(x) = \frac{d}{dx}(f(x)) = 8x + 3$$

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

$$f'(x) = \frac{d}{dx}(f(x)) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$\circ$ $f(x+h) = 3(x+h)^2 - 5(x+h) - 4$

$= 3(x^2 + 2xh + h^2) - 5x - 5h - 4$

$= 3x^2 + 6xh + 3h^2 - 5x - 5h - 4$

$$\Rightarrow \lim_{h \to 0} \frac{(\cancel{3x^2} + 6xh + 3h^2 \cancel{- 5x} - 5h \cancel{- 4}) - (\cancel{3x^2} \cancel{- 5x} \cancel{- 4})}{h}$$

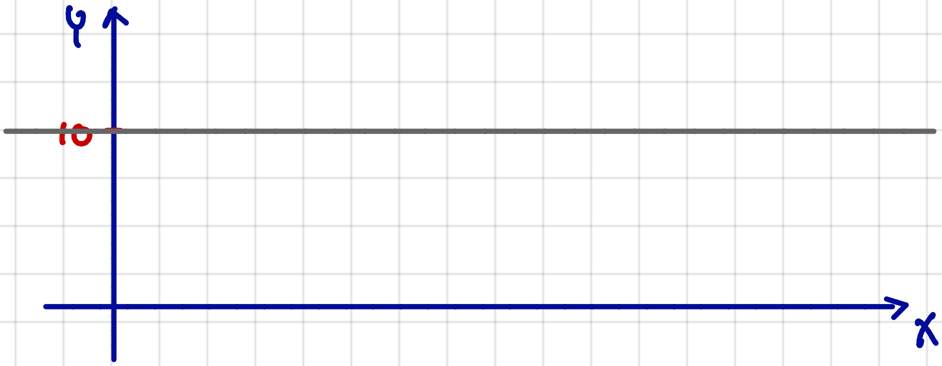
$$= \lim_{h \to 0} \frac{3h^2 + 6xh - 5h}{h}$$

$$= \lim_{h \to 0} \frac{\cancel{h}(3h + 6x - 5)}{\cancel{h}}$$

$$= \lim_{h \to 0} (3h + 6x - 5)$$

$$= \boxed{6x - 5}$$

4. $f(x)=10$



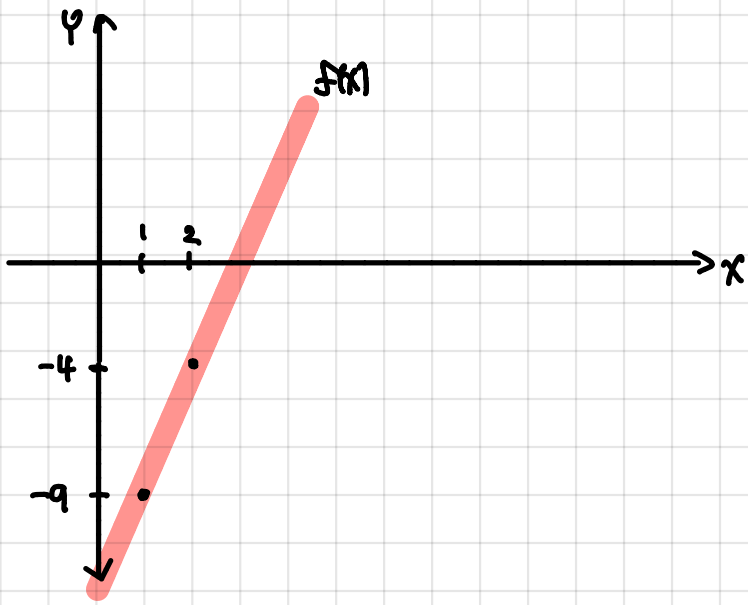
Since the slope of tangent line of this function is 0 (horizontal line), derivation is also 0.

$f'(x)=0$

5. $y=f(x)$ at $(2,-4)$ passes through $(1,-9)$

Find $f(2)$, $f'(2)$

1. DRAW THE GRAPH



2. FIND $f(2)$

when $x=2$, $y=-4$

$\therefore f(2)=-4$

3. FIND $f'(2)$

$$\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$$

$$=\lim_{h\to 0}\frac{f(2+h)-f(2)}{h}$$

we have the value $f(1)$, so h is -1

$$=\lim_{h\to 0}\frac{f(1)-f(2)}{-1}$$

$$=-\left(f(1)-f(2)\right)$$

$$=-(-9+4)$$

$$=\boxed{5}$$

1. (1 point) Let $f(x) = 2x + 8$. Then according to the definition of derivative

$f'(x) = \lim_{h\to 0}$ ____________________

(Your answer above will involve both h and x.)

Taking the limit of this expression gives us

$f'(x) =$ __________

(Example 4 on page 496 is similar.)

Answer(s) submitted:

- `[(2x+2h+8)-(2x+8)]/h`
- `2`

(correct)

2. (1 point) Let $f(x) = 4x^2 + 3x + 8$. Then according to the definition of derivative

$f'(x) = \lim_{h\to 0}$ ____________________

(Your answer above will involve both h and x.)

Taking the limit of this expression gives us

$f'(x) =$ __________

(Example 2 on page 495 is similar.)

Answer(s) submitted:

- `[(4x^2+3x+8xh+4h^2+3h+8)-(4x^2+3x+8)]/h`
- `8x+3`

(correct)

3. (1 point) Let $f(x) = 3x^2 - 5x - 4$. Then according to the definition of derivative

$f'(x) = \lim_{h\to 0}$ ____________________

(Your answer above will involve both h and x.)

Taking the limit of this expression gives us

$f'(x) =$ __________

Answer(s) submitted:

- `3h+6x-5`
- `6x-5`

(correct)

4. (1 point) Let $f(x) = 10$. Use the definition of derivative to find $f'(x)$.

$f'(x) =$ ________

Answer(s) submitted:

- `0`

(correct)

5. (1 point) If the tangent line to $y = f(x)$ at $(2, -4)$ passes through the point $(1, -9)$, find

A. $f(2) =$ ________

B. $f'(2) =$ ________

Answer(s) submitted:

- `-4`
- `5`

(correct)