

1. What words/phrases/formulas are associated with average rate of change?

$\frac{\text{rise}}{\text{run}}$ , slope of a secant line  
 ↳ over an interval → over 2 pts

2. What words/phrases/formulas are associated with instantaneous rate of change?

slope at 1 point, tangent line, derivative

3. Use the original limit definition of derivative to find the derivative of each of the following.

a)  $f(x) = 4x^3 + 2$

$f'(x) = 12x^2$

b)  $f(x) = -\frac{1}{x-4}$

rewrite it w/a negative exponent  $f(x) = -1(x-4)^{-1}$  derivative of inside  
 $f'(x) = 1(x-4)^{-2} \cdot (1)$   
 $f'(x) = \frac{1}{(x-4)^2}$

4. Use the alternative definition of the derivative to find the derivative of each of the following.

a)  $f(x) = \sqrt{5x-4}$  at  $x = 4$  practice w/ shortcut

$f(x) = (5x-4)^{\frac{1}{2}}$   
 $f'(x) = \frac{1}{2}(5x-4)^{-\frac{1}{2}} \cdot 5$  derivative of inside

$f'(x) = \frac{5}{2\sqrt{5x-4}}$   $f'(4) = \frac{5}{2\sqrt{5(4)-4}} = \frac{5}{2\sqrt{16}} = \frac{5}{8}$

b)  $f(x) = 4x^2 + 2x + 1$  at  $x = -1$ .

$f'(x) = 8x + 2$

$f'(-1) = -8 + 2$   
 $= -6$

5. Write the equation of the tangent line and normal line to the function  $f(x) = 4x - 5$  at  $x = 3$ .

$$x=3, f(3)=7, f'(3)=4$$

$$y-7=4(x-3)$$

Tangent

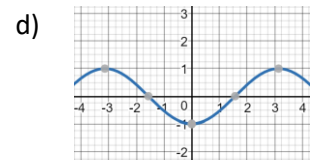
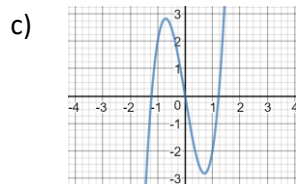
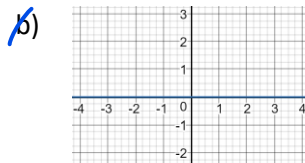
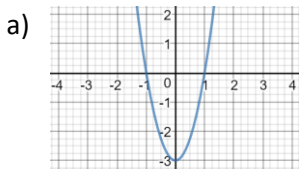
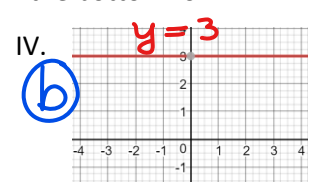
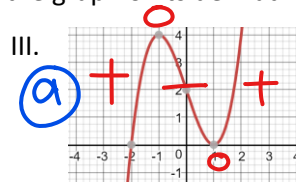
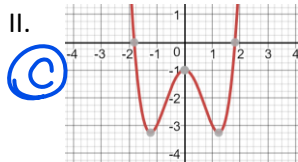
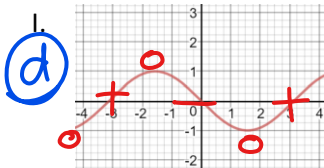
$$y-7=-\frac{1}{4}(x-3)$$

Normal

6. If  $f'(1) = -5$  and  $f(1) = -3$ , find the equation of the tangent line to  $f(x)$  at  $x = 1$ .

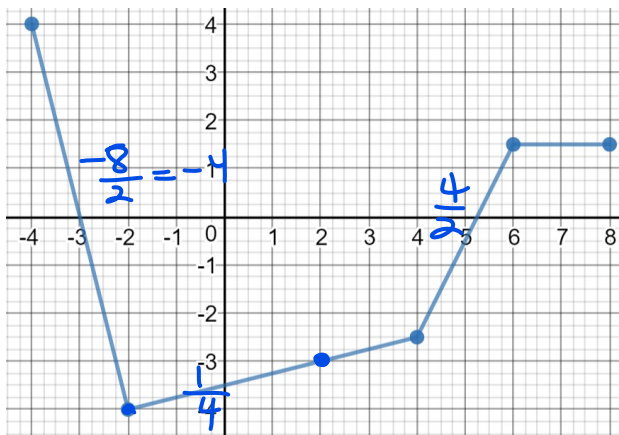
$$y+3=-5(x-1)$$

7. Match the graph of each function in the top row with the graph of its derivative in the bottom row.

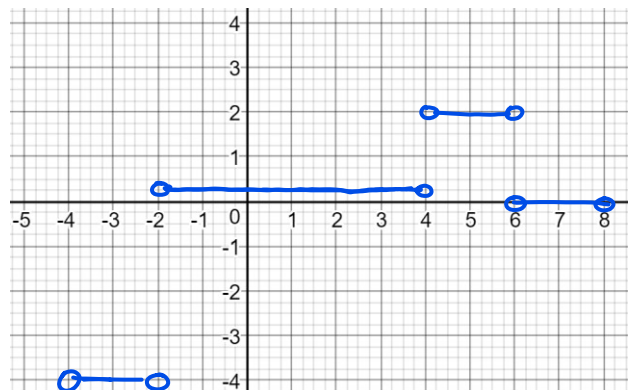


8. The graph of the function  $y = f(x)$  shown here is made of line segments joined end to end. Graph  $f'(x)$  in the space provided below.

Graph of  $f(x)$



Graph  $f'(x)$  here



$$\frac{1.5}{6} \rightarrow \frac{3/2}{6}$$

$$\rightarrow \frac{3}{12} \rightarrow \frac{1}{4}$$