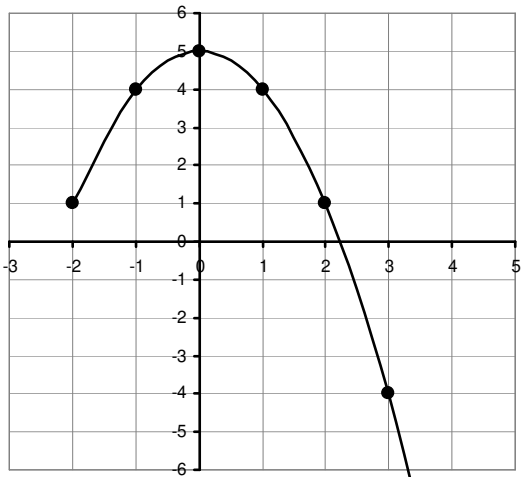
1. Find the indicated quantities for $f(x) = 5 - x^2$.



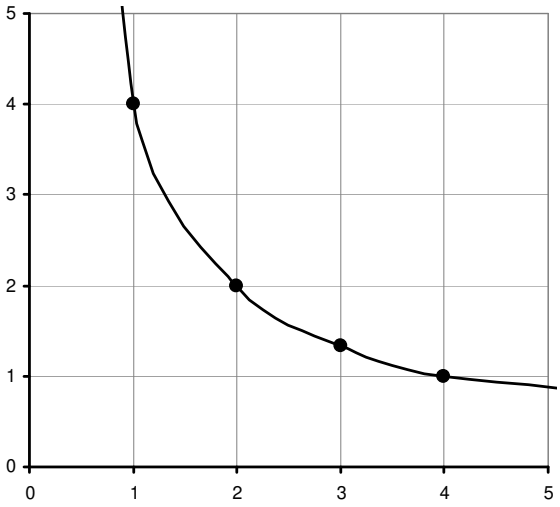
   a. $\dfrac{f(3) - f(1)}{3 - 1}$

   b. $\dfrac{f(2) - f(1)}{2 - 1}$

   c. $\dfrac{f(x + h) - f(x)}{h}$

   d. $\lim\limits_{h \to 0} \dfrac{f(x + h) - f(x)}{h}$

2. Find the indicated quantities for $f(x) = 4/x$.



   a. $\dfrac{f(4) - f(2)}{4 - 2}$

   b. $\dfrac{f(3) - f(2)}{3 - 2}$

   c. $\dfrac{f(x + h) - f(x)}{h}$

   d. $\lim\limits_{h \to 0} \dfrac{f(x + h) - f(x)}{h}$

3. Find the indicated quantities for $f(x) = 3x^2$.
   a. The average rate of change from $x = 1$ to $x = 4$.
   b. The average rate of change from $x = 1$ to $x = 2$.
   c. The instantaneous rate of change at $x = 1$.
   d. What is the slope of the tangent line at $x = 1$?
   e. Write the equation of the tangent line at $x = 1$.

4. Find the indicated quantities for $f(x) = x^2 - 4x + 1$.
   a. The average rate of change from $x = 3$ to $x = 5$.
   b. The average rate of change from $x = 3$ to $x = 4$.
   c. The instantaneous rate of change at $x = 3$.
   d. What is the slope of the tangent line at $x = 3$?
   e. Write the equation of the tangent line at $x = 3$.

For Problems 5 - 7, use the four-step process to find $f'(x)$. Then use your answer to find $f'(1)$, $f'(2)$, and $f'(3)$.

5. $f(x) = 3x - 7$
6. $f(x) = 2 - 3x^2$
7. $f(x) = x^2 + 6x + 10$

Slope = $\frac{Rise}{Run} = \frac{y_2 - y_1}{x_2 - x_1}$

Slope = Average Rate of Change

Derivative = Instantaneous Rate of Change at a Point = Slope of the Tangent Line at the Point

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Point-Slope Equation of a Line: $(y - y_1) = m(x - x_1)$ (x_1, y_1) is a point on the line
m is the slope of the line

Four-Step Process for Finding a Derivative:

Step 1. Find $f(x + h)$

Step 2. Find $f(x + h) - f(x)$

Step 3. Find $\frac{f(x + h) - f(x)}{h}$

Step 4. Find $\lim_{h \to 0} \frac{f(x + h) - f(x)}{h}$

There are many symbols that mean "derivative". Here are the most common ones: $f'(x)$, y', $\frac{dy}{dx}$, $\frac{d}{dx} f(x)$