

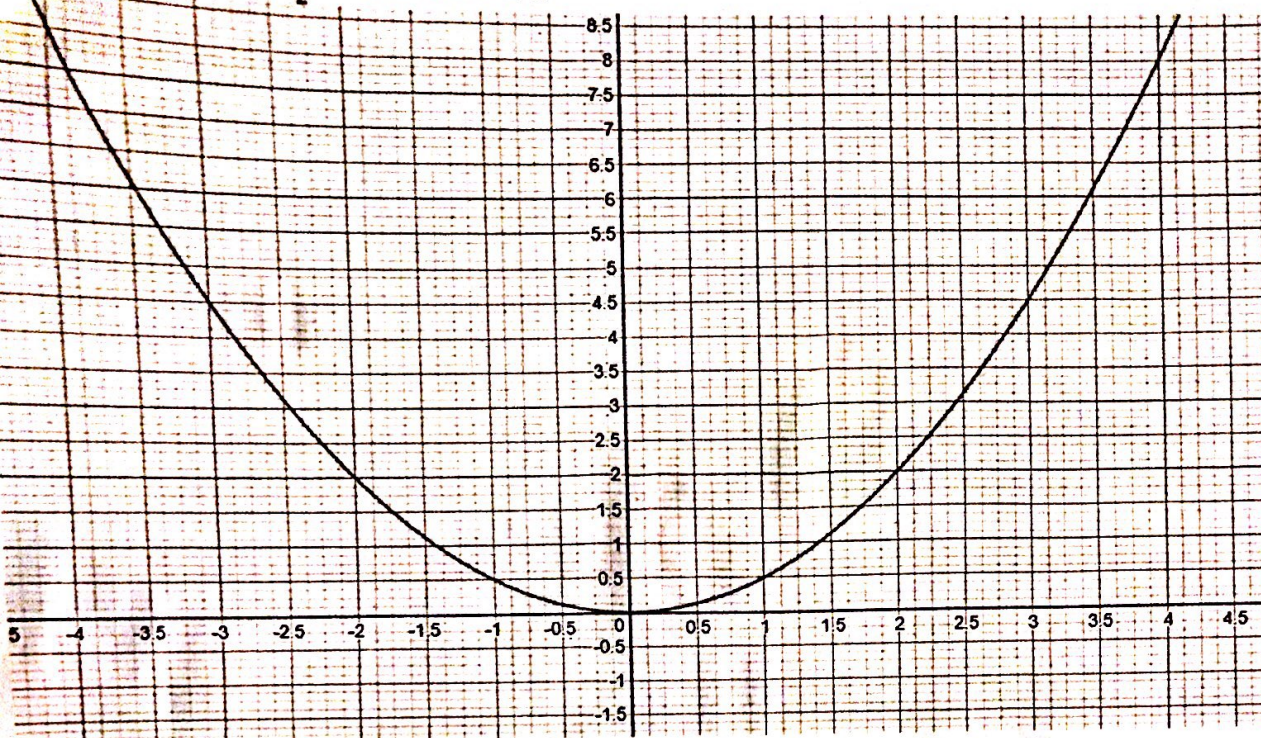
10. Consider the points $(x, f(x))$ and $(x + h, f(x + h))$ on the graph given by the function $f(x) = x^2$.

a) Write an expression for the average rate of change between the two points.

b) Determine the average rate of change if $h = 0$.

c) Determine the limit of the average rate of change expression you wrote for part a as h approaches 0.

The graph of $f(x) = \frac{1}{2}x^2$ is shown below



- a) Sketch the line containing the points $(1, f(1))$ and $(4, f(4))$ and then determine the slope of the line you sketched.
- b) Sketch the line containing the points $(1, f(1))$ and $(2, f(2))$ and then determine the slope of the line you sketched.
- c) Sketch the line containing the points $(1, f(1))$ and $(1.5, f(1.5))$ and then determine the slope of the line you sketched.
- d) determine the slope of the line containing the points $(1, f(1))$ and $(1.1, f(1.1))$.
- e) determine the slope of the line containing the points $(1, f(1))$ and $(1.001, f(1.001))$.
- f) In your own words, explain what is happening to the slope of the line containing the two points as the second point gets very close to the first point.

Name _____

Activity 43 - Derivatives

Section _____

2. Consider the function $f(x) = \frac{1}{2}x^2 + x - 2$

a) Use the definition of the derivative to write the limit for determining the derivative of f .

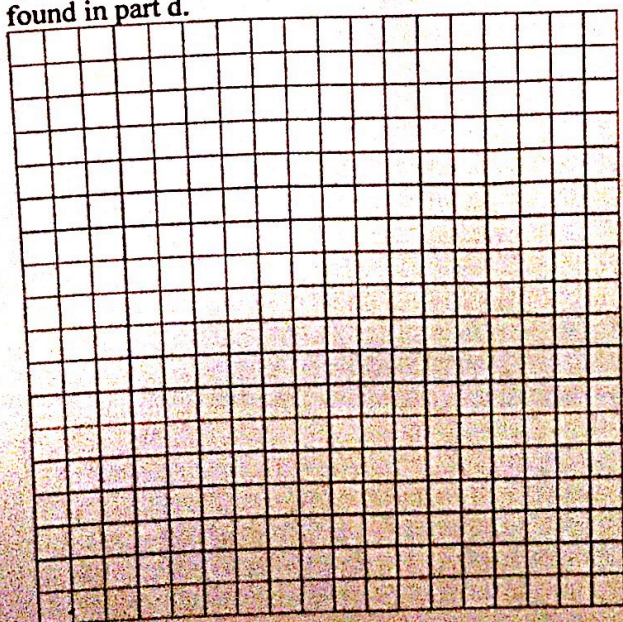
$$f'(x) =$$

b) Determine $f'(x)$ and completely simplify.

c) Determine $f'(-2)$.

d) Write the equation of a line with a slope of $f'(-2)$ and containing the point $(-2, f(-2))$

c) Graph and clearly label both $f(x)$ and the line that you found in part d.



d) In your own words, describe the relationship between the graph of f and the graph of the line. Why do you think this happened?