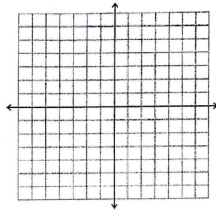


5.4 Exercises
Unit 4 - Day 6: Piecewise Functions

Part 1. Evaluate the piece-wise function for the given inputs. Then, carefully graph each function.

1. $f(x) = \begin{cases} x+2 & x < 1 \\ 2x-4 & x \geq 1 \end{cases}$

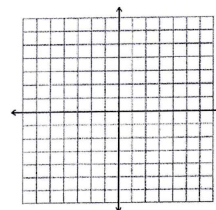
- $f(-1) =$
- $f(0) =$
- $f(1) =$
- $f(5) =$



Continuous or Discontinuous?

2. $f(x) = \begin{cases} 2x+10 & x < -2 \\ x^2+2 & -2 \leq x \leq 1 \\ 3 & x > 1 \end{cases}$

- $f(-1) =$
- $f(0) =$
- $f(1) =$
- $f(5) =$



Continuous or Discontinuous?

6

Unit 5 - Functions and Limits

5.1 Evaluating Functions and Average Rate of Change

$f(x) = 2x^2 + 3x - 1$ $(-2x)^2$

a. $f(0) = 2(0)^2 + 3(0) - 1 = -1$ $(-2)^2 =$

b. $f(-2x) = 2(-2x)^2 + 3(-2x) - 1$ $-2 \cdot -2 = 4$
 $\uparrow = 2(4x^2) - 6x - 1$

$= 8x^2 - 6x - 1$

c. $f(x+4) = 2(x+4)^2 + 3(x+4) - 1$

$= 2(x^2 + 8x + 16) + 3x + 12 - 1$

$= 2x^2 + 16x + 32 + 3x + 11$

$= 2x^2 + 19x + 43$

d. $f(x+h) - f(x) = 2(x+h)^2 + 3(x+h) - 1 - (2x^2 + 3x - 1)$

$= 2(x+h)(x+h) + 3x + 3h - 1 - 2x^2 - 3x + 1$

$= 2(x^2 + 2xh + h^2) + 3h - 2x^2$ $\frac{2h^2}{h} = 2h$

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

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

$= h(2h + 4x + 3)$

2) $f(x) = x^3 - 4$ $(-2)^3 = -8$

a. $f(0) = -4$

b. $f(-2x) = -8x^3 - 4 \rightarrow (-2x)^3 - 4$
 $= -8x^3 - 4$

c. $f(x+4) = x^3 + 12x^2 + 48x + 60$

d. $f(x+h) - f(x) = 3x^2 + 3xh + h^2$

c. $(x+4)^3 - 4 = (x+4)(x+4)(x+4) - 4$

$= x^3 + 12x^2 + 48x + 60$

d. $x^3 - 4 - (x+h)^3 + 4$

$= (x+h)(x+h)(x+h) - x^3 - 4 + 4$

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

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

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

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

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

Average Rate of Change

Slope = $\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

Ex. Find the average of change of $f(x) = 2x^2$

a. from 0 to 2

x	y	$(2x^2)$	$(0,0)$	$(2,8)$
---	---	----------	---------	---------

$\frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 0}{2 - 0} = \frac{8}{2} = 4$

Slope of secant line through 2 points

b. from 5 to 8

$2(5)^2 = 50 \rightarrow (5,50)$

$2(8)^2 = 128 \rightarrow (8,128)$

$\frac{128 - 50}{8 - 5} = \frac{78}{3} = 26$

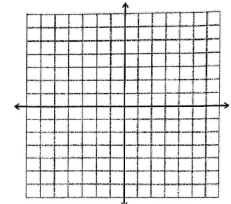
$= 26$

$h(x) = 2x^2 - 2x$
 Write the equation of the secant line containing $(2, h(2))$ and $(4, h(4))$.
 $y = 2(2)^2 - 2(2)$
 $y = 8 - 4 = 4$
 $y = 2(4)^2 - 2(4)$
 $y = 32 - 8 = 24$
 $(2, 4)$ and $(4, 24)$
 $y = m x + b$
 slope $= \frac{24 - 4}{4 - 2} = \frac{20}{2} = 10$
 $4 = 10(2) + b$
 $4 = 20 + b$
 $-20 = -20$
 $b = -16$
 $y = 10x - 16$

3. $f(x) = \begin{cases} -2x+1 & x \leq 2 \\ -(x-4)^2+1 & x > 2 \end{cases}$

$f(-4) =$
 $f(0) =$
 $f(4) =$

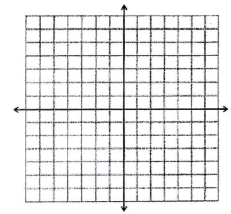
Continuous or Discontinuous?



4. $f(x) = \begin{cases} |x+3| & x \leq 0 \\ 2x-1 & 0 < x \leq 2 \\ 3 & x > 2 \end{cases}$

$f(-2) =$
 $f(0) =$
 $f(2) =$

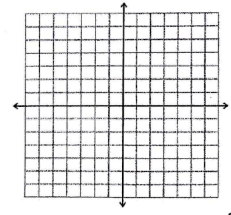
Continuous or Discontinuous?



5. $f(x) = \begin{cases} x^2 & x \leq 0 \\ -x^2+4 & x > 0 \end{cases}$

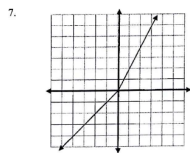
$f(-2) =$
 $f(0) =$
 $f(2) =$

Continuous or Discontinuous?



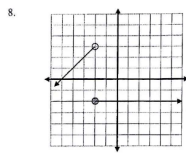
7

Part II. Write equations for the piecewise functions whose graphs are shown below. Assume that the units are 1 for every tic mark.



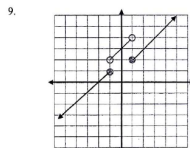
$f(x) = \{$

Continuous or Discontinuous?



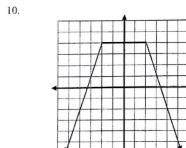
$f(x) = \{$

Continuous or Discontinuous?



$f(x) = \{$

Continuous or Discontinuous?



$f(x) = \{$

Continuous or Discontinuous?

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