

EXAM 1 - MATH 111

Friday, February 9

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Find the domain of $f(x) = \frac{x+7}{2x^2-x-15}$.

(a) Find the domain of $f(x) = \sqrt{31-2x}$.

(b) Let $f(x) = 5x^2 + 19x + 16$. Find the values of x for which $f(x) = 20$.

2. (a) Find the average rate of change of the function $f(x) = 5x^2 - x$ on $[3, 3+h]$ and simplify.

- (b) Sketch the graph of the piece-wise defined function (please, do a neat job and label all important points)

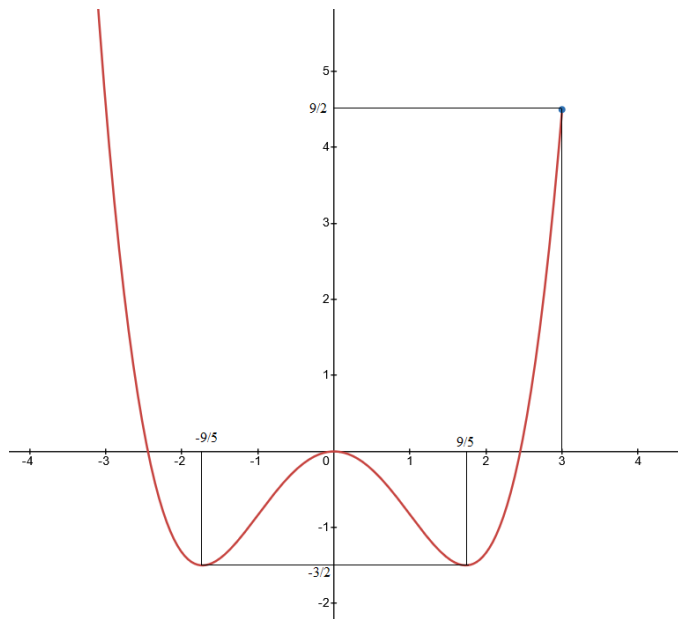
$$f(x) = \begin{cases} x^2 - 1, & \text{if } -2 \leq x < 1, \\ -x + 4, & \text{if } x \geq 2. \end{cases}$$

3. (a) Suppose $f(x) = \frac{8x}{x+1}$ and $g(x) = \sqrt{x^2 + 5}$.
(i) Compute $(f \circ g)(2)$.

(ii) Compute $(g \circ f)(1)$.

- (b) Suppose $f(x) = \frac{1}{x+5}$ and $g(x) = \frac{1}{x+2}$. Calculate $(f \circ g)(x)$ and simplify.

4. The graph of $y = f(x)$ is shown in the picture (only filled-in endpoints are included).

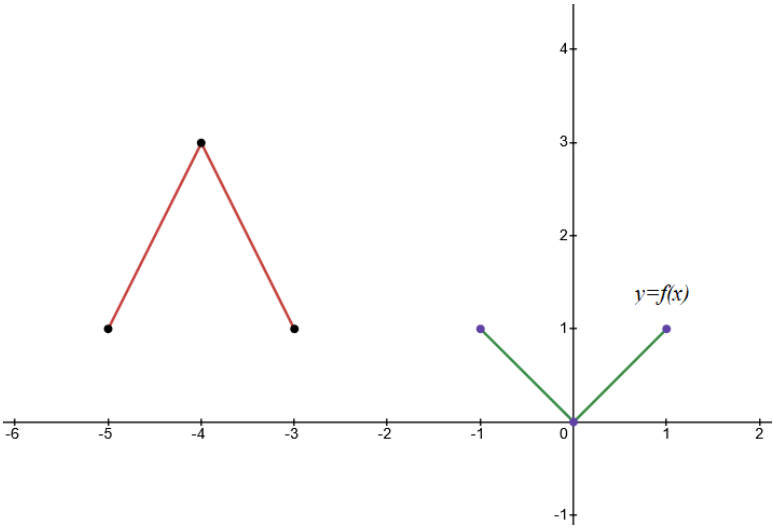


- (a) Find the domain of $y = f(x)$ (in interval notation).
- (b) Find the range of $y = f(x)$ (in interval notation).
- (c) Find the intervals over which f is increasing/decreasing.
- (d) Find the relative max/min points.
- (e) Find the absolute max/min points.

5. (a) Starting with $y = f(x)$, we would like to get to $y = f(2x - 3) - 4$. Fill in the blanks in the following table giving the formulas and a description of the individual transformations that are required.

$y = f(x)$	$\longrightarrow$	(		)	
	$\longrightarrow$	(		)	
	$\longrightarrow$	$y = f(2x - 3) - 4$	(		)

- (b) Fill in the following table giving the formulas and a description of the individual transformations that are required to produce $y = g(x)$ starting from $y = f(x)$.



$y = f(x)$	$\longrightarrow$	(		)
	$\longrightarrow$	(		)
	$\longrightarrow$	(		)
	$\longrightarrow$	$y =$	(	)