EXAM 1 - MATH 111 Friday, September 20

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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. Consider the function $f(x) = -x^2 + 3x + 7$.

   (a) Compute $f(5)$.

   (b) Compute $f(5+h)$ and simplify.

   (c) Compute $\dfrac{f(5+h) - f(5)}{h}$ and simplify.

   (d) Find for which values of the input the output of f is equal to -63.

2. Consider the piece-wise defined function

$$f(x) = \begin{cases} x^2, & \text{if } x < 0, \\ -x + 2, & \text{if } 0 \leq x \leq 1, \\ 2x - 2, & \text{if } x > 1. \end{cases}$$

(a) Compute the values

$f(-1) =$

$f(0) =$

$f(1) =$

$f(2) =$

(b) Sketch the graph of $f(x)$ (please do it neatly and place labels on the axes for all important points).

3. Consider the functions $f(x) = \dfrac{3}{2x+1}$ and $g(x) = \dfrac{1}{x-5}$.

(a) Compute the value $(f \circ g)(7)$ showing all steps.

(b) Find a formula for $(g \circ f)(x)$ and simplify.

(c) Find the domain of each of the functions f and g.

(d) Find the domain of $f \circ g$ showing all your work.

4. In the following parts, you are supposed to detail the transformations leading from the function $y = f(x)$ to the function indicated. To do this, fill-in the spaces left blank, as we did for many similar examples in class.

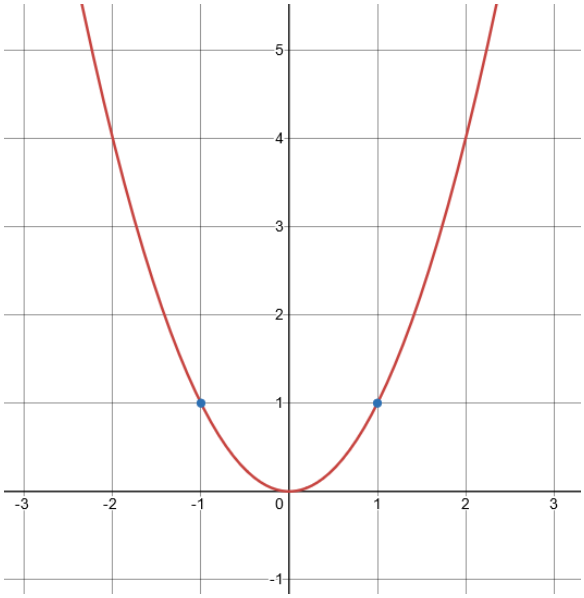
   (a)

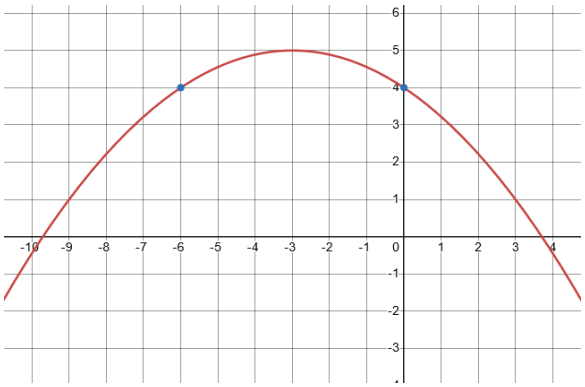
$$y = f(x) \longrightarrow \qquad (\qquad)$$

$$\longrightarrow \qquad (\qquad)$$

$$\longrightarrow \quad y = 3f(x+2) - 7 \qquad (\qquad)$$

   (b) The graph of the parent function $y = f(x)$ is on the left. The transform is on the right.





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

$$\longrightarrow \qquad (\qquad)$$

$$\longrightarrow \qquad (\qquad)$$

$$\longrightarrow \qquad (\qquad)$$

5. (a) Solve the absolute value equation

$$|5x - 11| + 17 = 61.$$

(b) Discover a formula for the inverse function $f^{-1}(x)$ of $f(x) = \dfrac{x}{5 - 3x}$.