Math 111 Exam 1 Review

Name: ______________________________

1. Given the following functions, perform the indicated evaluations.

x	$f(x)$
-6	$\frac{2}{5}$
-4	$\frac{2}{3}$
-2	2
-1	und.
0	-2
5	$\frac{1}{3}$

$g(x) = -2\sqrt[3]{x+3} + 2$

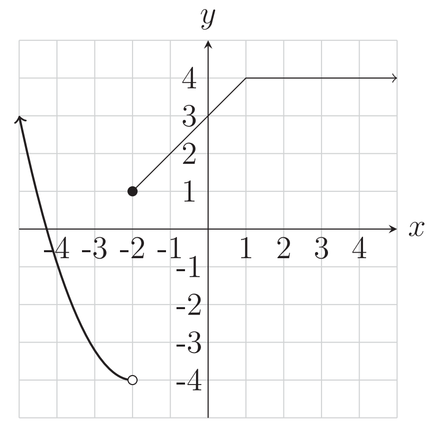


Figure 1: $y = h(x)$

a. $f(-1)$

b. $g(5)$

c. $h(-2)$

d. $f(-4)$

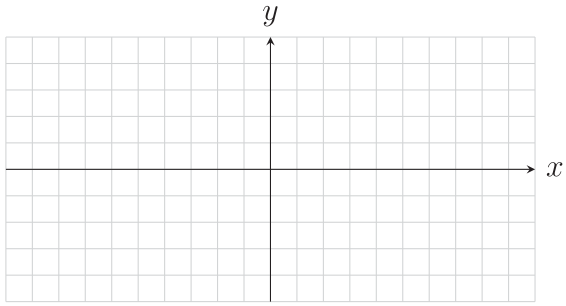
2. Determine the domains and ranges of the following functions. Use a graph to determine the range!

a. $f(x) = \dfrac{x-3}{2x^2+5x-12}$

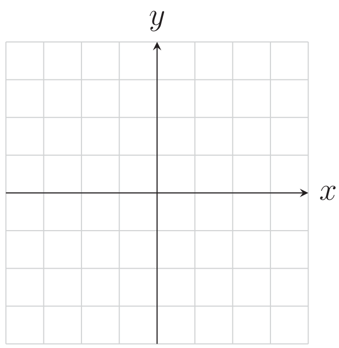
b. $g(x) = -\sqrt{x+4} - 3$

3. Sketch the following functions from memory. Include key points/asymptotes.

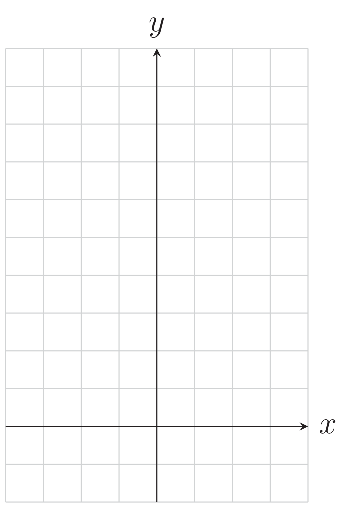
a. Graph $f(x) = \sqrt[3]{x}$



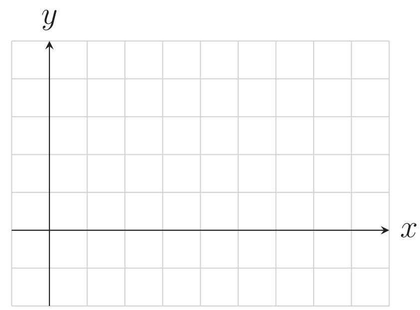
b. Graph $f(x) = x$.



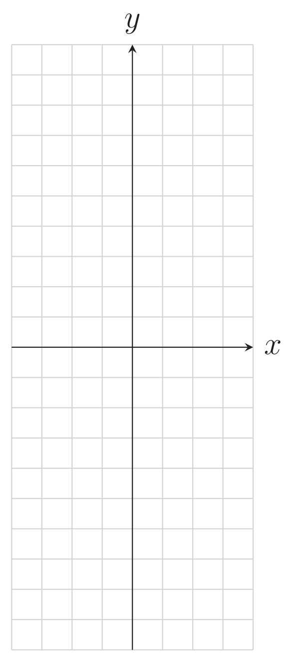
c. Graph $f(x) = x^2$.



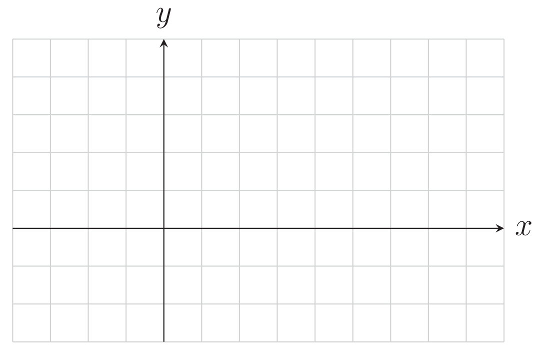
d. Graph $f(x) = \sqrt{x}$.



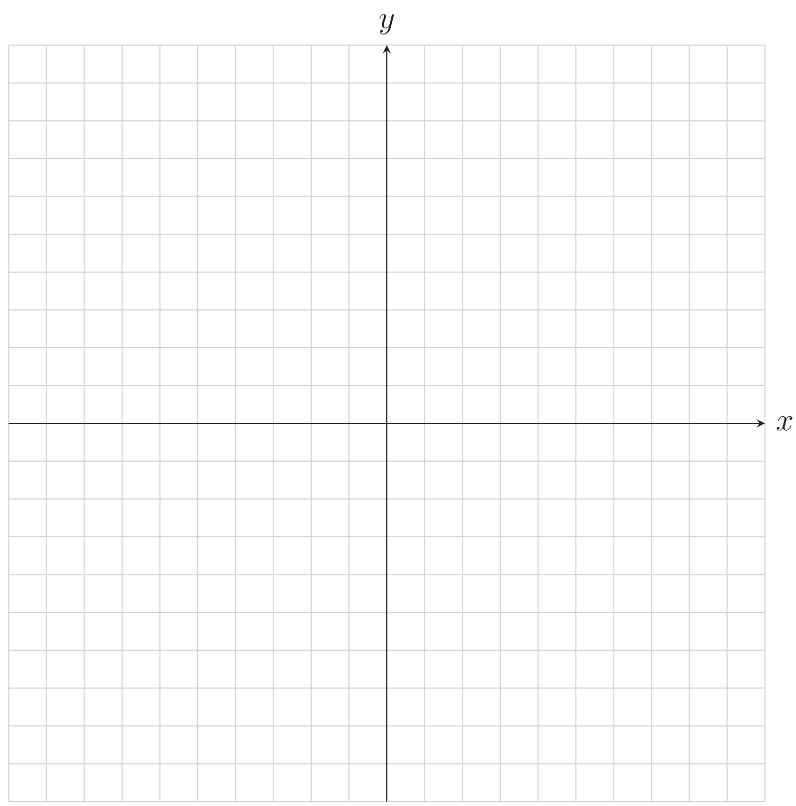
e. Graph $f(x) = x^3$.



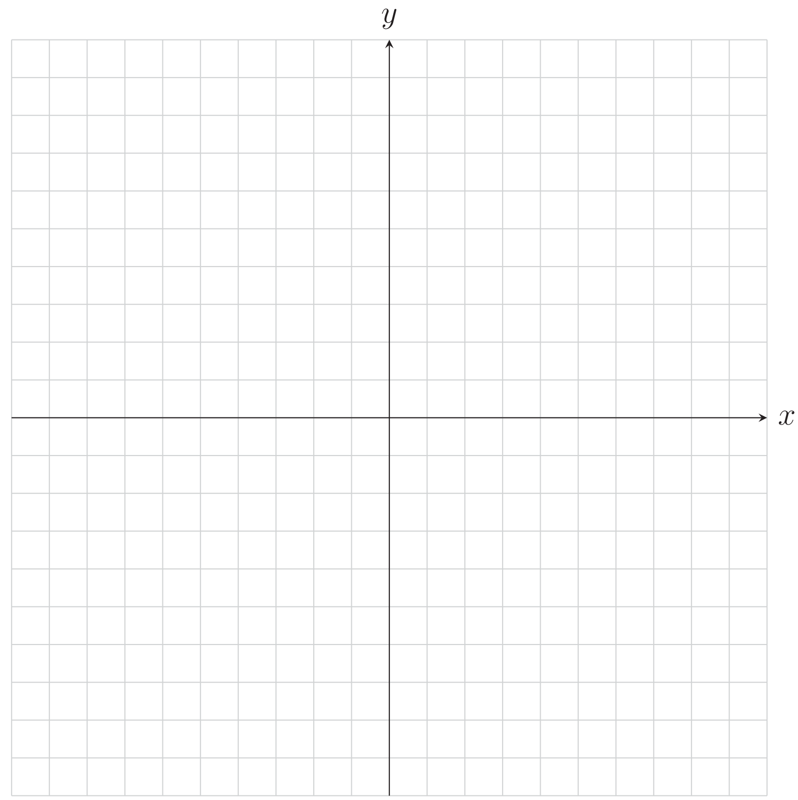
4. Use a transformation of $sqrt(x) = \sqrt{x}$ to graph the function $f(x) = \sqrt{x+2} - 1$.



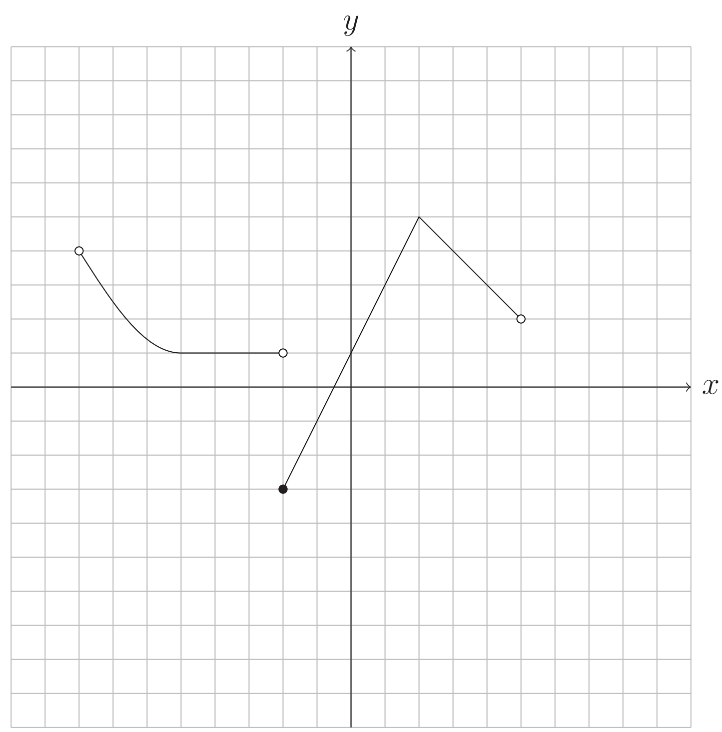
5. Use a transformation of $sqr(x) = x^2$ to graph the function $g(x) = -2\left(\frac{1}{3}(x-1)\right)^2 - 3$



6. Use a transformation of $cubert(x) = \sqrt[3]{x}$ to graph the function $g(x) = \frac{1}{2}\sqrt[3]{2x - 6} + 1$



7. Given the following graph of $y = g(x)$, draw the graph of $y = 2 \cdot g(x - 2) + 1$.



8. Let f and g be two functions defined as

$$f(x) = \frac{1}{x+2} \quad \text{and} \quad g(x) = \frac{x}{x-1}.$$

Find the following and find the domain in each case.

a. $(f+g)(x)$

b. $(f-g)(x)$

c. $(f \cdot g)(x)$

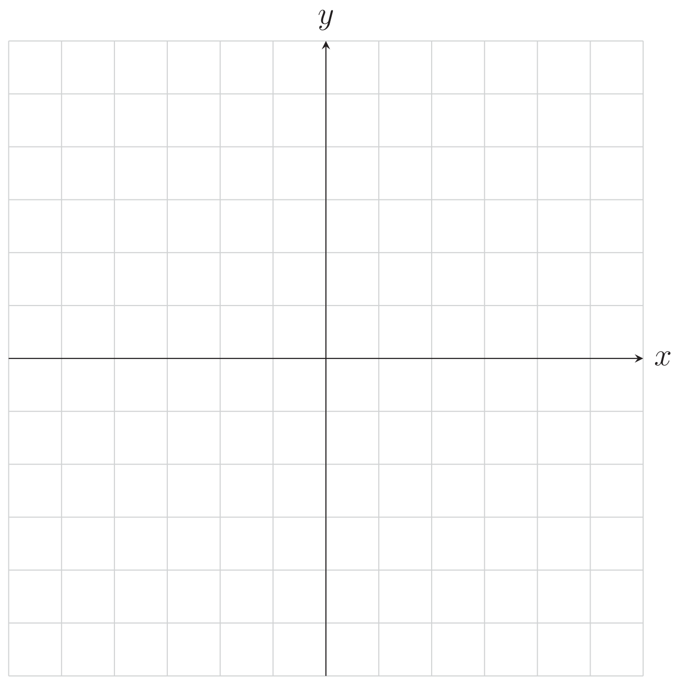
d. $\left(\frac{f}{g}\right)(x)$

9. Find the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = 3x^2 + x - 1$.

10. A function f defined as

$$f(x) = \begin{cases} \frac{1}{3}x - 2 & \text{if } -5 < x < -3 \\ 2(x+1)^2 - 5 & \text{if } -3 \leq x \leq 1 \\ 3 & \text{if } x > 2 \end{cases}$$

a. Graph $y = f(x)$.



b. Find $f(-4)$, $f(1)$, and $f(2)$.

d. Determine the domain and range of f.

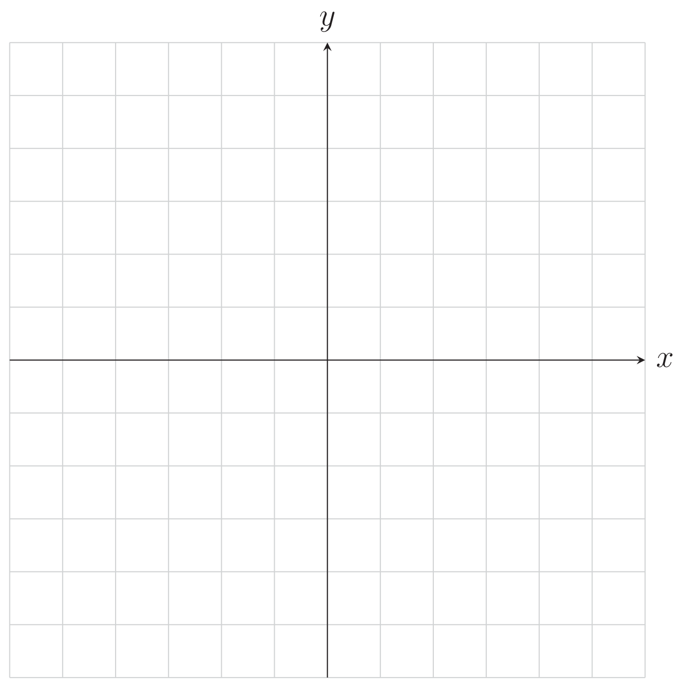
(a) Is f continuous *on its domain*?

c. Locate any intercepts.

11. A function f defined as

$$f(x) = \begin{cases} 4 & \text{if } x < -2 \\ -\dfrac{1}{2}x & \text{if } -2 \leq x < 2 \\ 3 & \text{if } x = 2 \\ (x-2)^2 - 3 & \text{if } 2 < x \leq 5 \end{cases}$$

a. Graph $y = f(x)$.



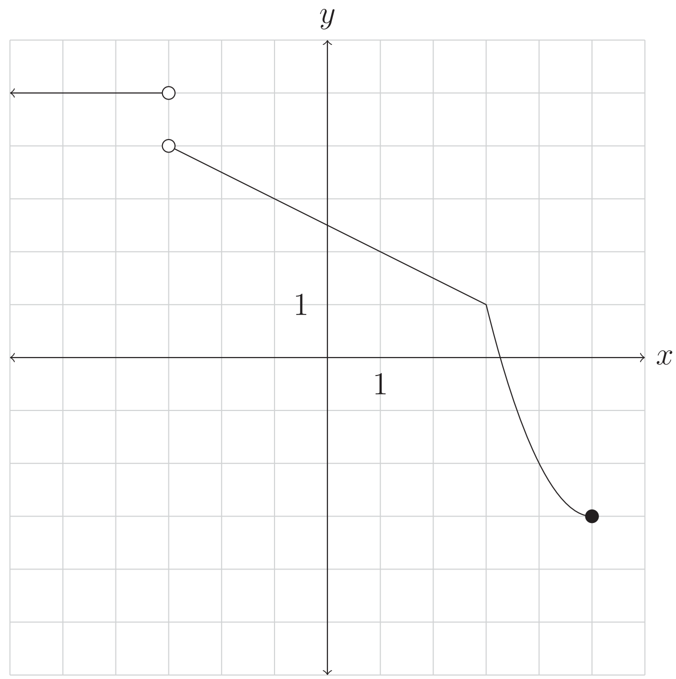
b. Find $f(-2)$, $f(2)$, and $f(5)$.

c. Locate any intercepts.

d. Determine the domain and range of f.

(a) Is f continuous *on its domain*?

12. The graph of a piecewise-defined function is given. Write a definition for the function.



13. Suppose that $f(x) = 2x^2 - 3$ and $g(x) = 4x$. Find the following:

a. $(f \circ g)(1)$

c. $(f \circ f)(-2)$

b. $(g \circ f)(1)$

d. $(g \circ g)(-1)$

14. Suppose that $f(x) = x^2 + 3x - 1$ and $g(x) = 2x + 3$. Find the following:

a. $(f \circ g)(x)$

b. $(g \circ f)(x)$

15. Suppose that $f(x) = \dfrac{2}{x-2}$ and $g(x) = \dfrac{4}{2x-5}$. Find the following and state the domain of each.

a. $f \circ g$

b. $f \circ f$

16. Find functions f and g such that $f \circ g = H$ if $H(x) = (x^2 + 1)^{50}$. In fact, find multiple solutions to this exercise.

17. Determine the inverse function of the function $F(C) = \frac{9}{5}C + 32$, which converts temperature from C degrees Celsius to F degrees Fahrenheit.

18. Determine whether the following functions are inverses of each other.

a. $f(x) = \frac{5}{2} - \frac{1}{2}x$ and $g(x) = -2x + 5$ b. $f(x) = -\frac{6}{x-1}$ and $g(x) = \frac{6+x}{x}$

19. Find the inverse of the following functions and then state the domain and range of each.

a. $f(x) = \dfrac{2x+1}{x-1}$

b. $g(x) = \dfrac{x-5}{3x+2}$

20. Restrict the domain of $f(x) = (x-2)^2 + 1$ so that it is one-to-one, find its inverse, state the domain and range of both, and graph both on the same axes.