Math 95 Exam 2 Review No Calculator Name: _____

1. The functions f, g, and h are described below. Use them to answer the following questions.

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

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

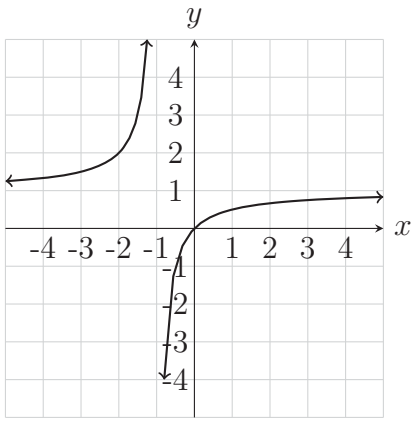
- 

Figure 1: $y = h(x)$

a. Evaluate $f(-1)$

b. Evaluate $g(0)$

c. Evaluate $h(-2)$

d. What is the domain and range of g?

e. Solve $f(x) = \dfrac{4}{3}$.

f. Solve $h(x) = 0$.

g. Solve $g(x) = 0$.

h. What is the domain and range of h?

2. Suppose you have a function M with $M(2) = -1$ and $M(-3) = 5$. What are two points on the graph of M?

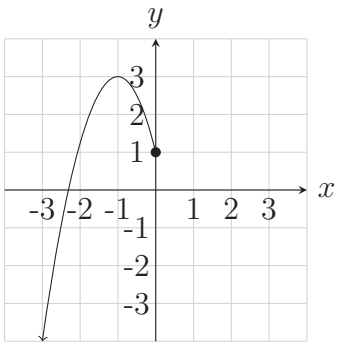
3. What is the definition of a solution to an equation in one variable?

4. Determine which of the following relationships between inputs and outputs can be categorized as a function and justify your response. Noe there are **three** questions here: two sets of points and one graph. Don't forget to answer this question for the graph! State the domain and range of the relations.

a.
$\{(-3,4),(1,-4),(0,0),(2,4),(-3,5)\}$

b.
$\{(.5,.5),(3,.5),(5,1),(7.5,.5),(-11.25,1)\}$

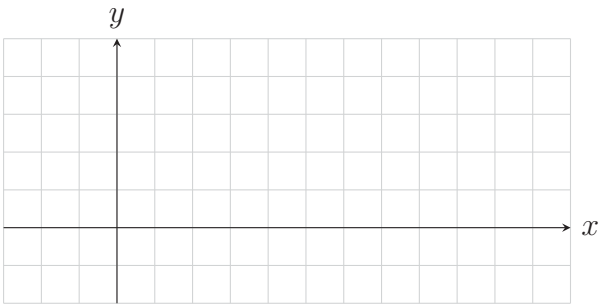
c.



5. What is the one requirement for a relationship between inputs and outputs to be considered a function?

6. Solve the equation $\frac{2}{3}x - 1 = -\frac{1}{3}x + 2$ numerically. Define a function to represent each side of the equation and use function notation in your table headings as appropriate. State a conclusion using set notation in a complete sentence. **Note: You will receive zero points for solving this equation symbolically.**

7. Solve the equation $\left|-\frac{1}{2}x+2\right| \geq 3$ graphically. Define a function to represent each side of the equation and label each functions graph appropriately. Label any x or y intercepts along with any intersection points. State a conclusion using set notation in a complete sentence. **Note: You will receive zero points for solving this equation symbolically.**



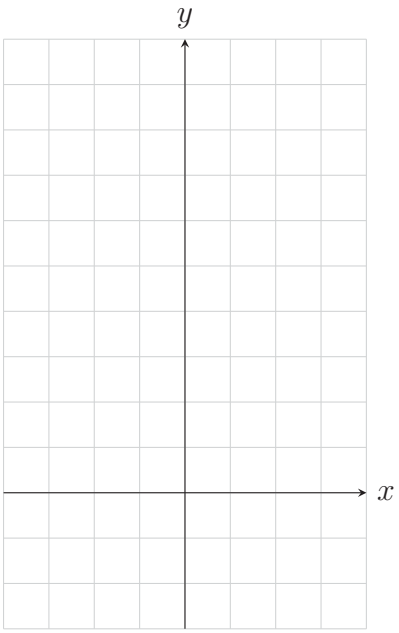
8. Solve the following equations symbolically. **Part of your grade for these problems is to *justify* breaking up the absolute value inequalities.** State a conclusion using interval notation within a complete sentence.

   a. $|3x-3| > -1$

   b. $2|3x+3| \leq 5$

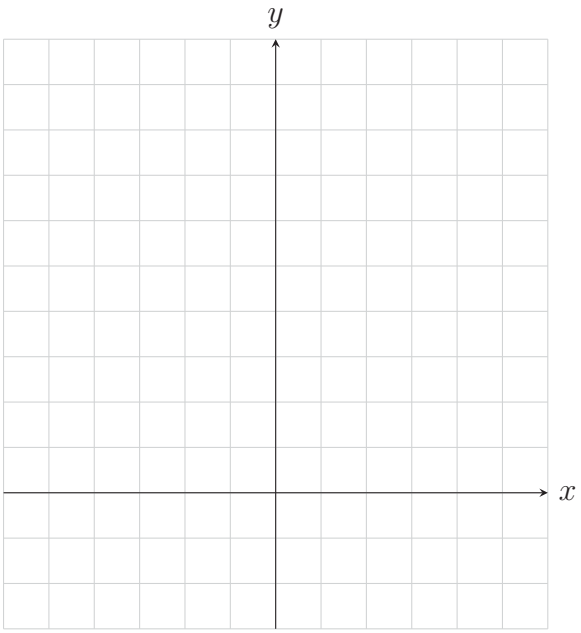
9. a. Make a table for $sqr(x) = x^2$ then graph $sqr(x) = x^2$ in the space provided. Label all points from the table along with the axis of symmetry.

x	$sqr(x)$



b. Make a table for $f(x) = (x-3)^2 + 1$ then graph $f(x) = (x-3)^2 + 1$ in the space provided.Label all points from the table along with the axis of symmetry.

x	$f(x)$



c. Describe using a complete sentence how the function sqr is translated to become f.

10. Complete the square of the following functions to put them into vertex form. Then state the vertex.

a. $f(x) = 2x^2 - 8x + 13$

b. $g(x) = 4x^2 + 12x + 10$

11. Evaluate the discriminant of the following functions and the state how many x-intercepts the function has based upon what number you found when evaluating the discriminant.

a. $f(x) = x^2 - 10x + 25$

b. $g(x) = -2x^2 - 4x + 1$

12. Solve the following quadratic equations using the quadratic formula. If your answer is complex, write it in standard complex number form and state your conclusion using set notation in a complete sentence.

a. Solve $f(x) = 0$ where $f(x) = -3x^2 - 5$.

b. Solve $g(x) = 0$ where $g(x) = 2x^2 - 12x + 19$.

13. You realize how awesome a trebuchet is and decide to build your own. It's a fantasticly huge wonder which you launch multiple pianos with. During the destroying of many a good piano you take measurements and determine the piano's flight path can be modeled by the function

$$f(d) = -0.031d^2 + 1.653d + 39.680,$$

where $h = f(d)$ is the height of the piano (in meters) at the given horizontal distance d (in meters) from the trebuchet.

Graph $h = f(d)$ in Desmos and use it to answer the following questions.

You need to use complete sentence conclusions to answer each of the following questions. Any rounding necessary should be to the second decimal place.

a. Use the graph in Desmos to determine the horizontal distance(s) of the piano from the trebuchet when it is at a height of 55 meters.

b. Use the graph in Desmos to determine at what horizontal distance from the trebuchet the piano will hit the ground.

c. Use the graph in Desmos to determine *the maximum height* the piano reaches **and** *the horizontal distance of the piano from the trebuchet* when it reaches this maximum height.

d. From what height is the piano released?

e. State the domain and range of f *in context* of this story problem.

14. Determine the domain of the following rational functions. Then graph the function in Desmos to determine its range.

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

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

c. $h(t) = \dfrac{4t^3}{t^3-t}$

15. Multiply or divide and simplify the following rational products. Be sure to identify any places where two expressions are not equivalent despite being equivalent for all other inputs.

a. $\dfrac{2x^2y^3}{3xy^2} \cdot \dfrac{(2x^3y)^2}{2(xy)^3}$

b. $\dfrac{x^3-x}{x-1} \cdot \dfrac{x+1}{x}$

c. $\dfrac{x^2-1}{x^2+x-6} \div \dfrac{x-1}{x+3}$

d. $\dfrac{x^2-25}{x^2+5x+4} \div \dfrac{x^2-10x+25}{2x^2+8x}$

16. Add and simplify the following rational sums and differences.

a. $\dfrac{3}{x^2} - \dfrac{x+3}{x^2}$

b. $\dfrac{2x}{x^2-1} - \dfrac{x+1}{x^2-1}$

c. $\dfrac{5a}{b^2} - \dfrac{4b}{a^2}$

d. $\dfrac{x-1}{x} - \dfrac{5}{x+5}$

e. $\dfrac{1}{x^2-3x+2} - \dfrac{1}{x^2-x-2}$

f. $\dfrac{1}{x-3} - \dfrac{2}{x+3} + \dfrac{x}{x^2-9}$

17. Simplify the following complex fractions.

a. $\dfrac{1+\dfrac{1}{x}}{1+\dfrac{1}{y}}$

b. $\dfrac{1-\dfrac{1}{x}}{1+\dfrac{1}{2x}}$

c. $\dfrac{n^{-2}+m^{-2}}{1+(nm)^{-2}}$

d. $\dfrac{\dfrac{1}{x^2+2x+1}-\dfrac{1}{x^2-2x+1}}{(x+1)(x-1)}$

18. Solve the following rational equations.

a. $\dfrac{x+1}{2x} - \dfrac{x-1}{4x} = \dfrac{1}{3}$

c. $\dfrac{1}{x} + \dfrac{1}{x^2} = \dfrac{3}{4}$

b. $\dfrac{3}{x-2} + \dfrac{5}{x+2} = \dfrac{12}{x^2-4}$

d. $\dfrac{2x}{x+2} + \dfrac{3x}{x-1} = 7$

19. Solve the following equation numerically, symbolically, and graphically.

$$\frac{1}{x-2}+\frac{1}{x+2}=-\frac{2}{3}$$

- Numerically:

- Symbolically

- Graphically: