

Name: \_\_\_\_\_

MATH 101

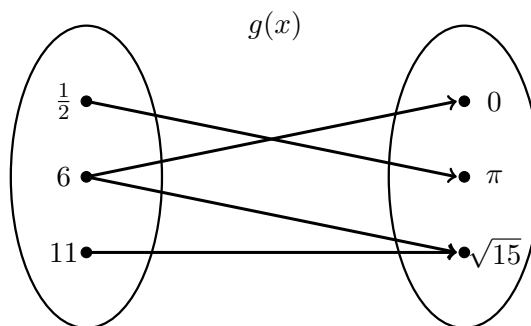
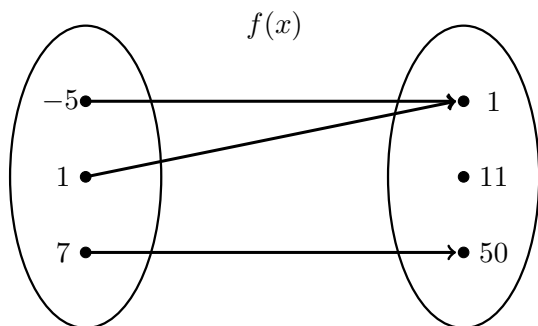
Summer 2022

HW 4: Due 05/31

*“Nothing has such power to broaden the mind as the ability to investigate systematically and truly all that comes under thy observation in life.”*

*– Marcus Aurelius*

**Problem 1.** (10pt) Determine if the relations  $f(x)$  and  $g(x)$  shown below are functions. Explain why or why not. If the relation is a function, determine its domain, codomain, and range.



**Problem 2.** (10pt) Determine if the relations  $f(x)$  and  $g(x)$  shown below are functions. Explain why or why not. If the relation is a function, compute the functions value at  $x = 4$ .

$$f(x) = 67.3 - 9.7x$$

$$g(x) = 11.1x^2 - 15.7x + 12.9$$

**Problem 3.** (10pt) Suppose  $f(x)$  and  $g(x)$  are the functions given below.

$x$	-3	-2	-1	0	1	2	3
$f(x)$	6	0	-4	5	4	-3	2
$g(x)$	0	3	1	1	2	9	6
$h(x)$	-1	5	-8	-3	8	2	0

Compute the following:

(a)  $(g + h)(1) =$

(b)  $(g - f)(0) =$

(c)  $(-2h)(3) =$

(d)  $\left(\frac{h}{g}\right)(2) =$

(e)  $f(1)h(-1) =$

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

(g)  $(f \circ g)(-2) =$

(h)  $(g \circ h)(-3) =$

(i)  $(h \circ g)(-3) =$

(j)  $(h \circ f \circ g)(1) =$

**Problem 4.** (10pt) Suppose  $f(x)$  and  $g(x)$  are the functions given below.

$$f(x) = 5x - 6$$

$$g(x) = 3x + 1$$

Compute the following:

(a)  $g(2) =$

(b)  $f(-1) =$

(c)  $2f(1) - g(2) =$

(d)  $f(x) - g(x) =$

(e)  $f(x)g(x) =$

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

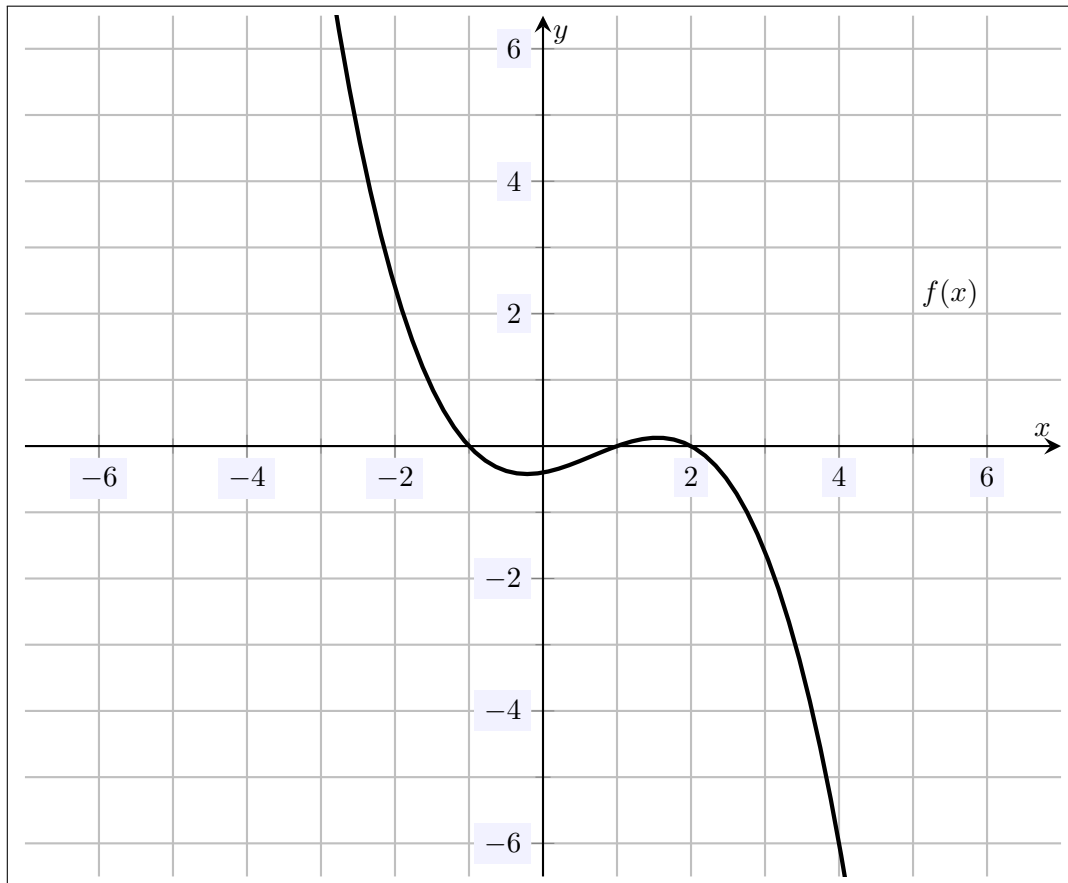
(g)  $(f \circ g)(0) =$

(h)  $(g \circ f)(1) =$

(i)  $(f \circ g)(x) =$

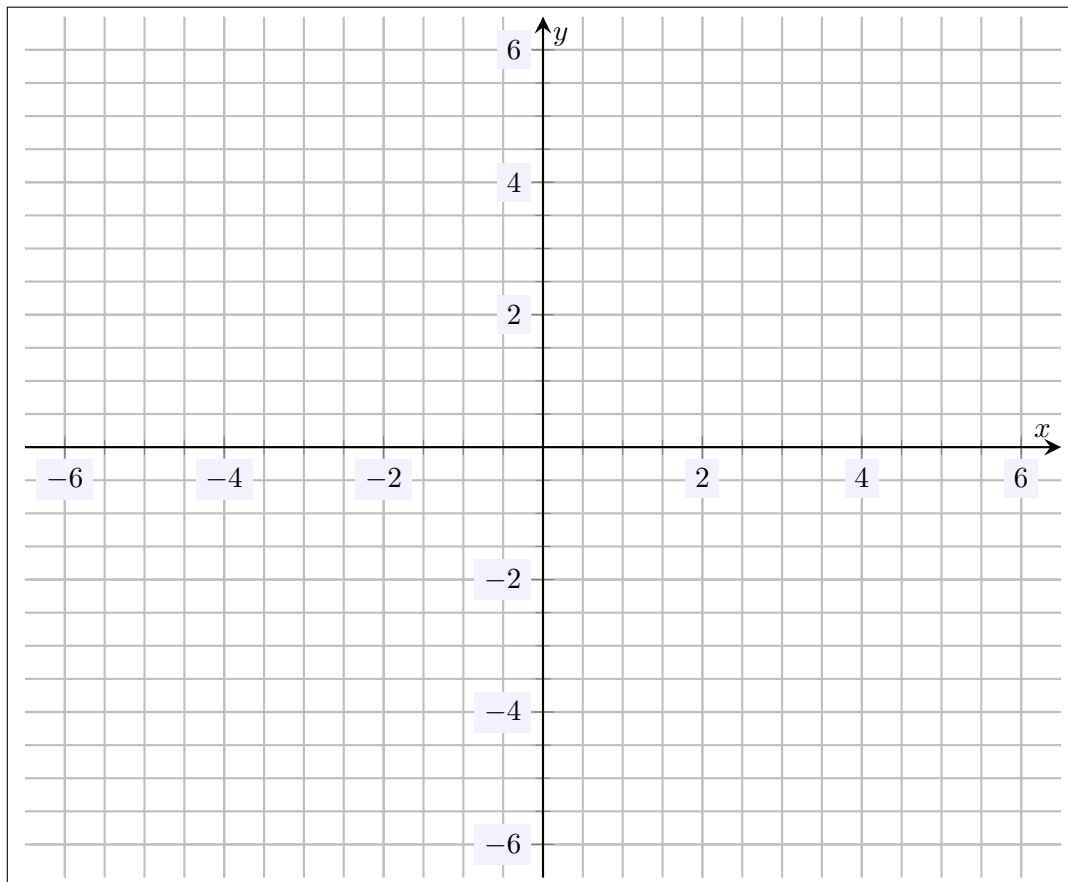
(j)  $(g \circ f)(x) =$

**Problem 5.** (10pt) Determine if the relation below is a function or not. If it is a function, explain why. If it is not a function, explain why.

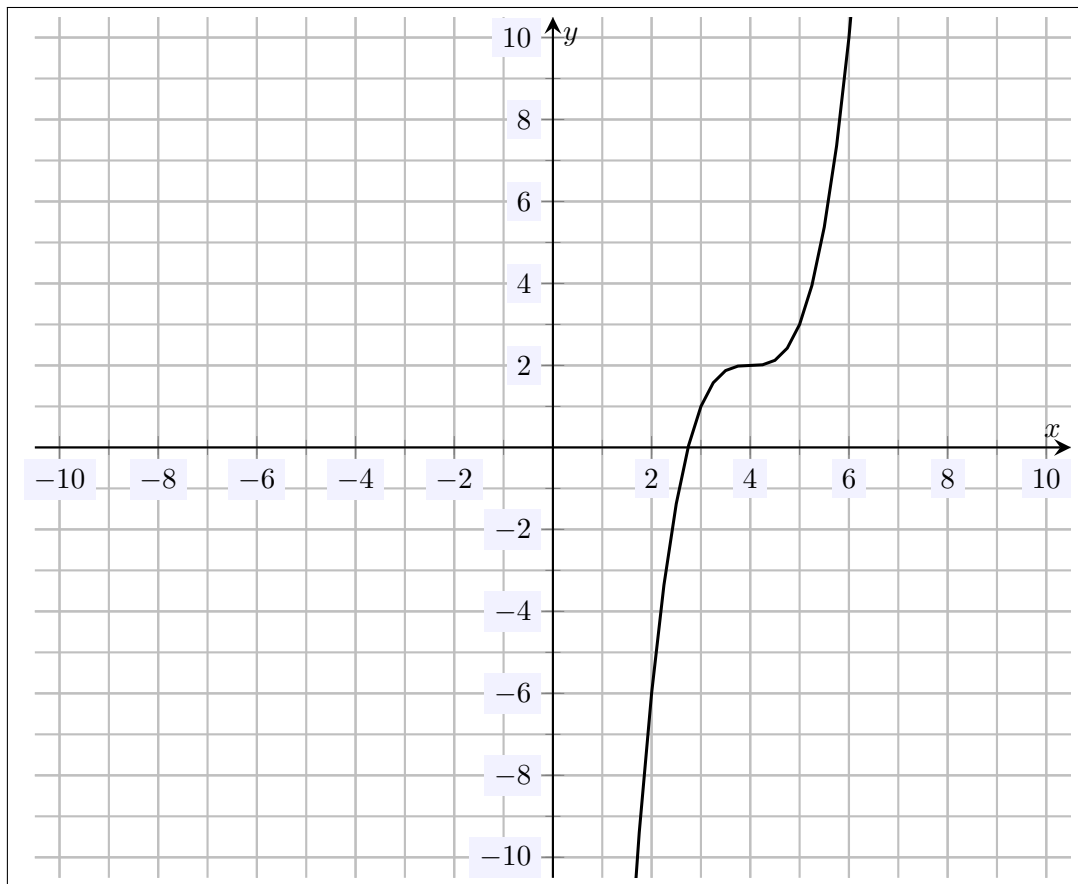


**Problem 6.** (10pt) Determine whether the point  $(3, -4)$  is on the graph of  $f(x) = \frac{x+1}{x-4}$ . Determine also whether the point  $(9, -2)$  is on the graph of  $f(x)$ . For each, explain why or why not.

**Problem 7.** (10pt) On the plot below and as accurately as possible, sketch the function  $f(x) = \frac{2x^2 - 5}{x + 11}$ .



**Problem 8.** (10pt) Explain why the function sketched below has an inverse and then sketch its inverse.





**Problem 9.** (10pt) How many  $y$ -intercepts can a function have? Explain. Is this the same for  $x$ -intercepts? Explain.

**Problem 10.** (10pt) Using the concept of range and the fact that every non-horizontal line  $\ell(x)$  intersects any horizontal line, explain why the equation  $\ell(x) = c$  has a solution for every real number  $c$ .