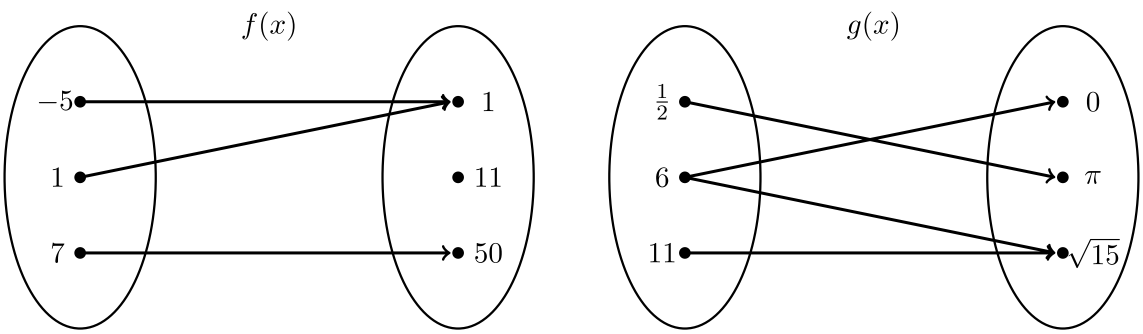
Name: ______________________________
MATH 101
Summer 2022
HW 4: Due 05/31

"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) $\left(\dfrac{h}{g}\right)(2) =$

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

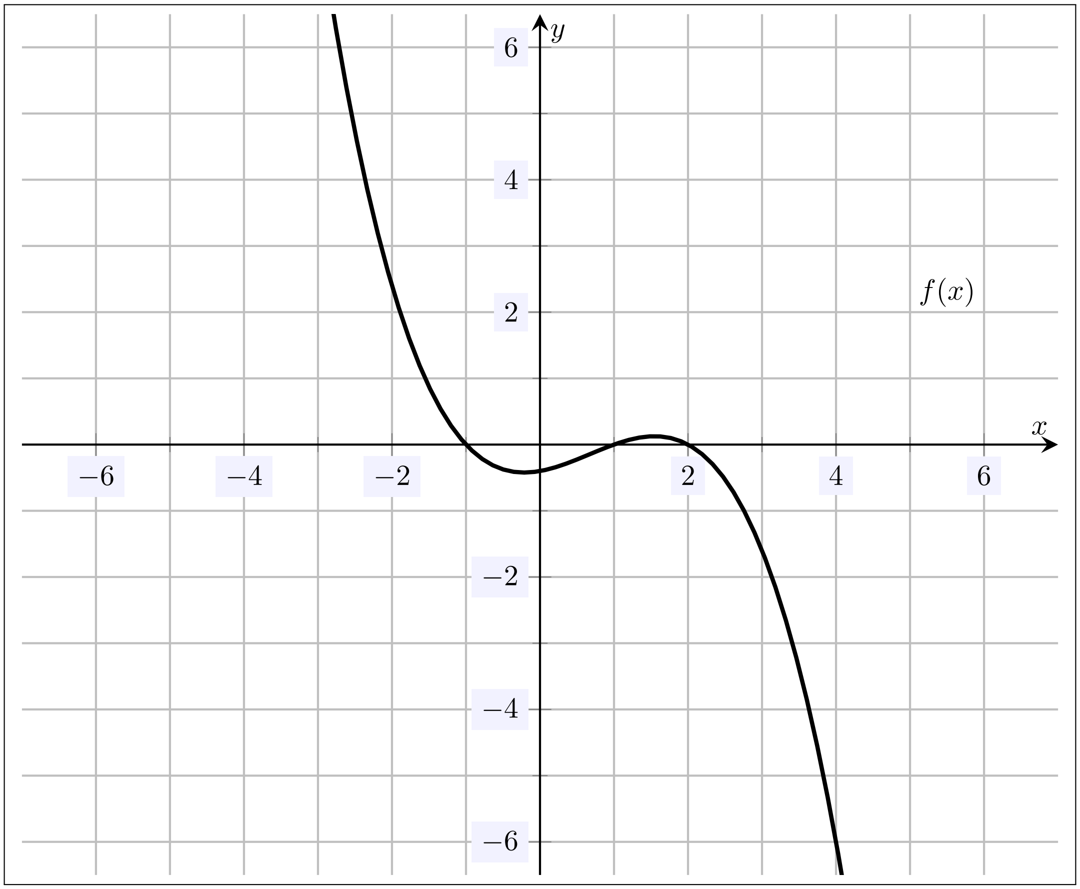
(g) $(f \circ g)(0) =$

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

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

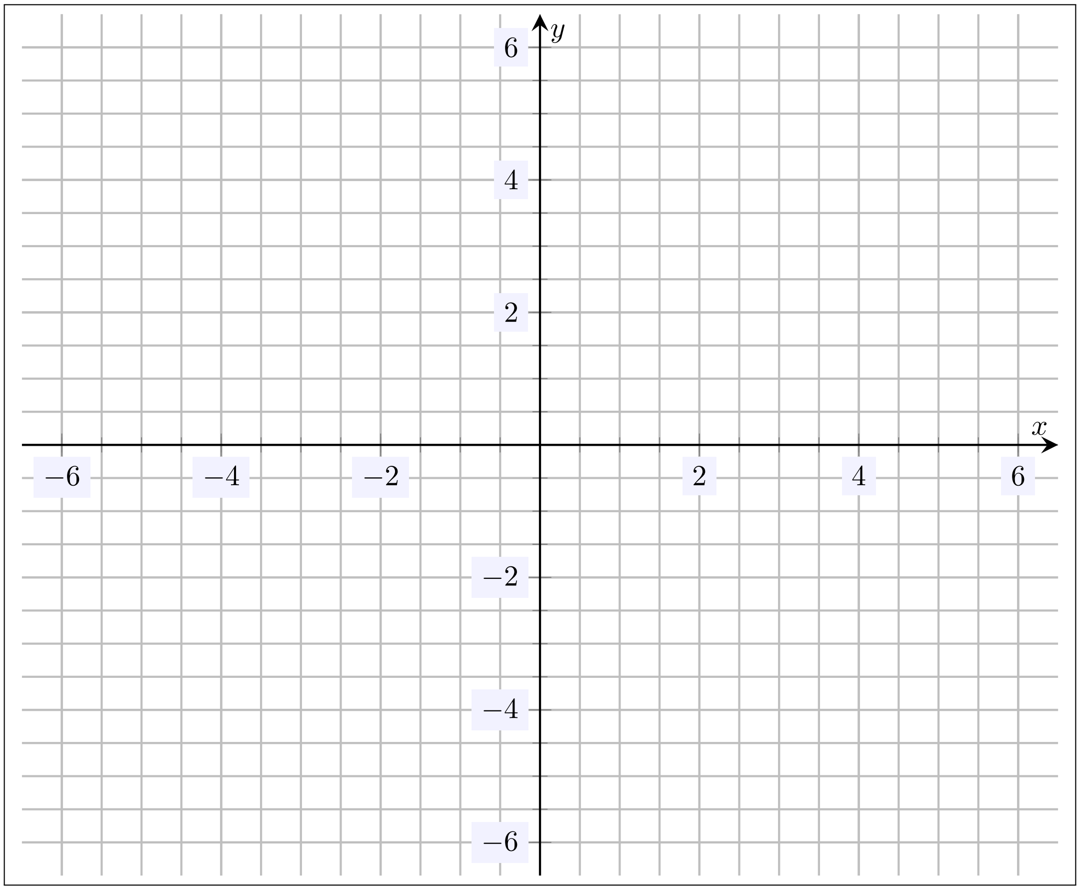
(j) $(g \circ f)(x) =$

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.

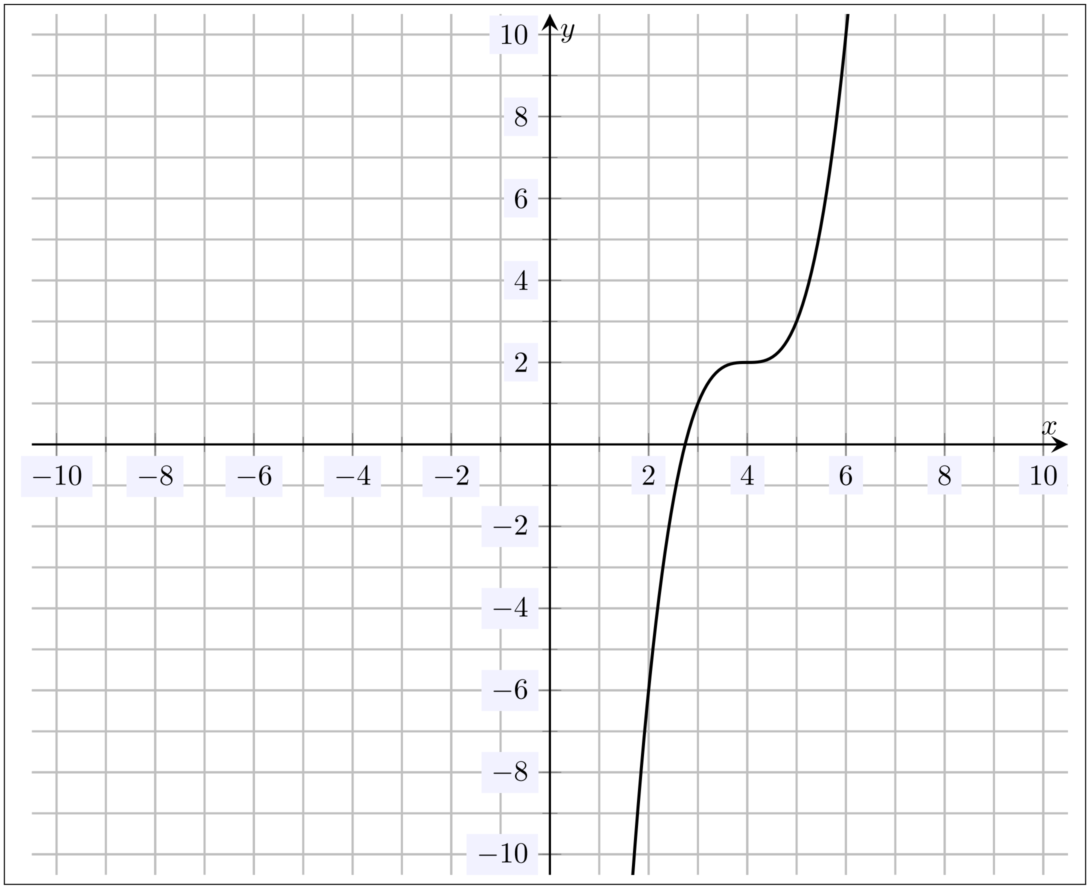


Problem 6. (10pt) Determine whether the point $(3, -4)$ is on the graph of $f(x) = \dfrac{x+1}{x-4}$. Determine also whether the point $(9, -2)$ is on the graph of $f(x)$. For each, explain why or why not.

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



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.