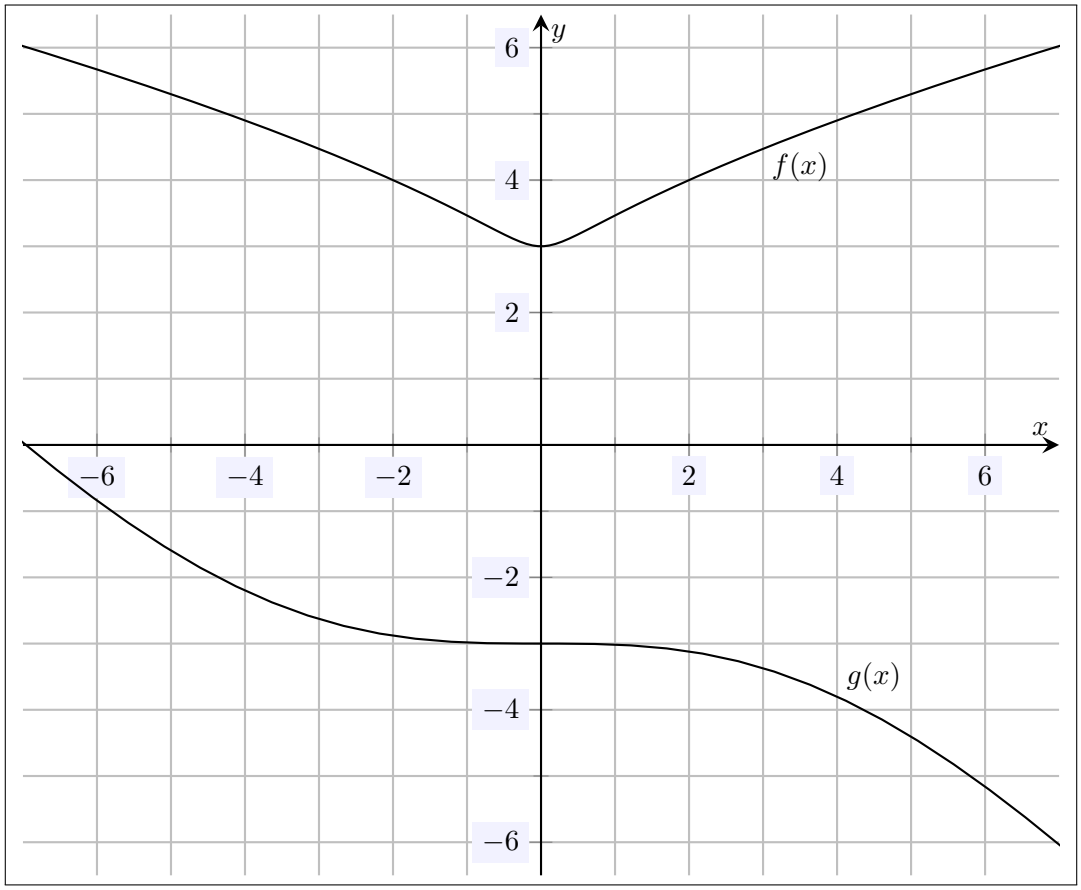
Name: _____

MATH 101
Fall 2021
HW 7: Due 10/08

"I'm pretty but tough, like a diamond or beef jerky in a ball gown."
– Titus Andromedon, Unbreakable Kimmy Schmidt

Problem 1. (10pt) Two functions $f(x)$ and $g(x)$ are plotted below. Are $f(x)$ and $g(x)$ functions? Explain. Do the functions $f(x)$ and $g(x)$ have an inverse? Explain.



Problem 2. (10pt) Let $f(x) = 6x - 5$ and $g(x) = 2x^2 + 3x - 5$.

(a) What is $g(2)$?

(b) Assuming g^{-1} exists, what is $g^{-1}(9)$?

(c) Assuming f^{-1} exists, what is $f^{-1}(4)$?

Problem 3. (10pt) Do the points $(1, 3)$, $(3, 7)$, and $(5, 1)$ lie along a line? Justify your answer.

Problem 4. (10pt) Let $\ell(x)$ be the line through the points $(-2, 11)$ and $(3, -4)$.

(a) Find the slope of the line given by $\ell(x)$.

(b) Find the equation for $\ell(x)$.

(c) What is the y-intercept for $\ell(x)$?

(d) What is $\ell(-1)$?

Problem 5. (10pt) Let $\ell(x)$ be the line through the point $(1, 3)$ with slope $\frac{1}{2}$.

(a) Find the equation for $\ell(x)$.

(b) What is $\ell(4)$?

(c) Find the x-intercept for $\ell(x)$.

Problem 6. (10pt) Determine if the following pairs of lines are parallel, perpendicular, or neither.

(a) $y = 5x, \quad \frac{1}{5}x + y = 8$

(b) $x - 3y = 12, \quad y = x + 7$

(c) $y = 3x - 1, \quad 6x - 2y = 4$

Problem 7. (10pt) Find the equation of the line passing through the point $(1, -1)$ that is perpendicular to the line $y = \frac{1}{3}x - 8$.

Problem 8. (10pt) Let $f(x) = 2x - 1$. Find $f^{-1}(x)$. Show that $f^{-1}(x)$ is the inverse by showing $f(f^{-1}(x)) = x$ and $f^{-1}(f(x)) = x$.

Problem 9. (10pt) A cable internet company offers a high-speed internet package that costs $62 per month, plus an additional $85 installation fee.

(a) Find a function that represents the total cost of purchasing internet from this company after n months.

(b) What does the y-intercept for this function represent?

(c) Find the total cost of the internet after 14 months.

(d) How many months of internet can you get for $500?