Name: _____

MATH 101
Spring 2024
HW 10: Due 03/04

"I hate these nerds! Just 'cause I'm stupider than them they think they're smarter than me."

— Hubert J. Farnsworth, Futurama

Problem 1. (10pts) Let $f(x)$ be the function given by $f(x) = 4x - 5$.

(a) Find a value in the range of f. Be sure to justify why the value is in the range.

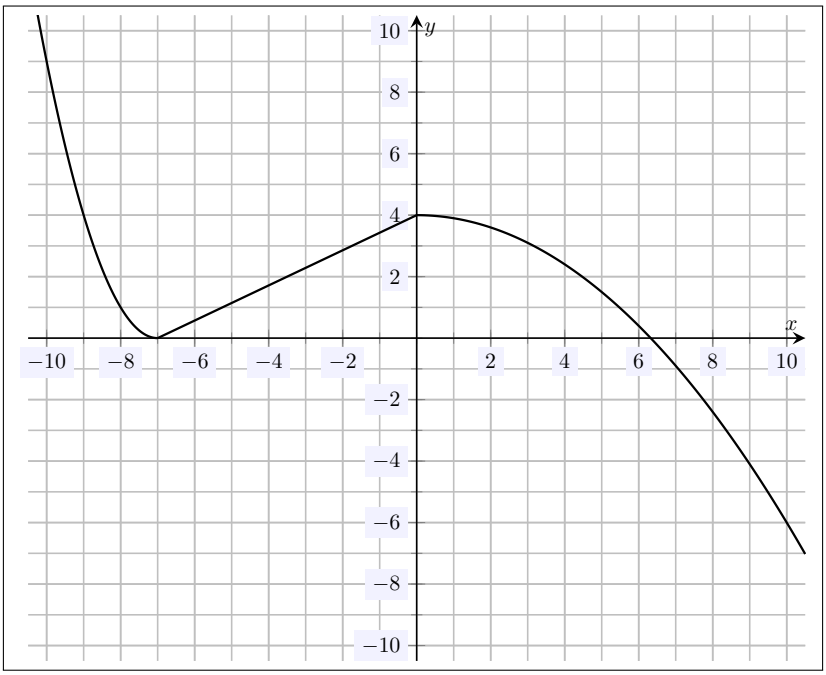
(b) Compute $f(-1)$. Is $(-1, -9)$ on the graph of f? Explain.

(c) Is there an x such that $f(x) = 11$? Explain.

(d) Is $2 \in f^{-1}(0)$? Explain.

(e) Assuming f^{-1} exists, what is $f(f^{-1}(\sqrt{2}))$ and $f^{-1}(f(\sqrt{2}))$?

Problem 2. (10pts) Consider the relation f plotted below.



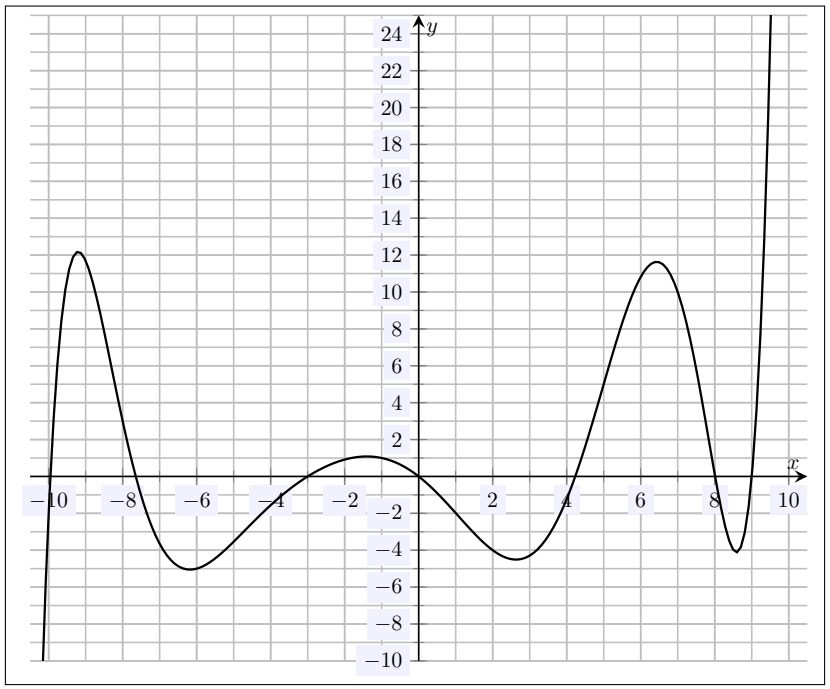
(a) Compute $f(-9)$ and $f(10)$.

(b) Is $f(x)$ a function? Explain.

(c) Does $f(x)$ have an inverse? If so, sketch the inverse. If not, explain why.

Problem 3. (10pts) Showing all your work, verify that $g(x) = \frac{1-x}{5}$ is the inverse function for $f(x) = 1 - 5x$. Also, compute $g(6)$. What does the value of $g(6)$ tell you about the function $f(x)$?

Problem 4. (10pts) A relation ϕ is plotted below.



Using the plot above, answer the following:

(a) Compute $\phi(5)$.

(b) Find the y-intercept for $\phi(x)$.

(c) Find the x-intercepts for $\phi(x)$.

(d) As accurately as possible, compute the preimage of -5, i.e. $\phi^{-1}(-5)$.

(e) Explain why (d) implies that ϕ does not have an inverse function.