

ALGEBRA 2 HONORS

PROBLEM SET 03

DUE DATE: JANUARY 29, 2024

Question 1. Use partial fraction decomposition to decompose the fractions

$$\frac{4x - 2}{x^2 + 2x - 8}, \quad \text{and} \quad \frac{7x - 5}{x^2 - 4x - 5}$$

Definition. A function f is called

- **even** if $f(-x) = f(x)$ for every x in $\text{Dom}(f)$
- **odd** if $f(-x) = -f(x)$ for every x in $\text{Dom}(f)$.

Odd functions are “symmetric about the origin” while even functions are “symmetric about the y -axis.”

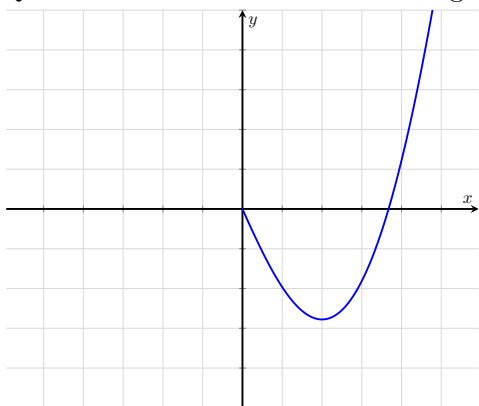
Question 2. Let f be an odd function and that 0 is in the domain of f . Prove that $f(0) = 0$.

Hint: use the definition of odd function.

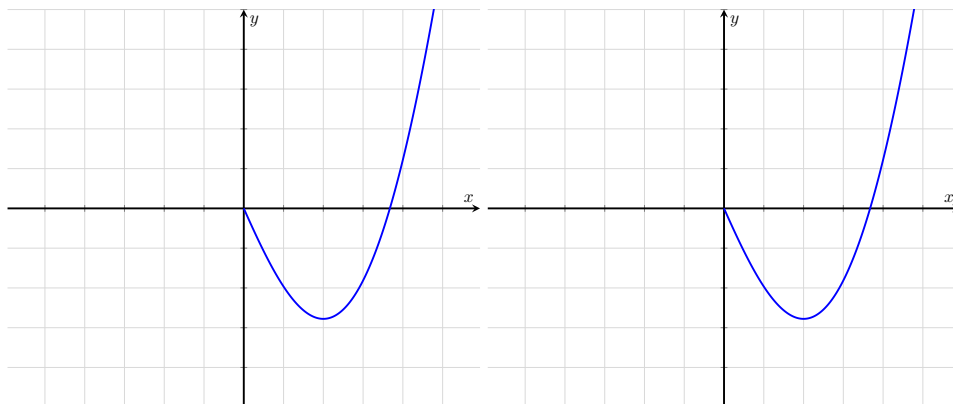
Question 3. Identify which of the functions are even, odd, or neither.

function	Even? Odd? Neither?
$f(x) = 3$	
$g(x) = 5x + 3$	
$h(x) = \sqrt{x}$	
$k(x) = x^2$	
$j(x) = x^2 + 2x + 1$	
$p(x) = x^3$	
$q(x) = \frac{1}{x}$	

Question 4. Consider the following function which is drawn below:



- (1) Complete the drawing assuming that $f(x)$ is an *even* function.
- (2) Complete the drawing assuming that $f(x)$ is an *odd* function.



Question 5. Let $f(x) = \frac{x+1}{x-1}$.

- (a) Find the inverse of $f(x)$, i.e. find formula for $f^{-1}(x)$
- (b) Compute the composition $(f \circ f^{-1})(x)$

Question 6. Identify which of the functions have inverses, and compute the inverse.

function	invertible? (Y/N)	inverse, if any
$f(x) = 3$		
$g(x) = 5x + 3$		
$h(x) = \sqrt{2x+1}$		
$k(x) = x^2$		
$p(x) = (x-1)^3$		

Question 7. Let $f(x) = 2x + 5$.

- (a) Find the inverse of $f(x)$, i.e. find formula for $f^{-1}(x)$
- (b) Compute the composition $(f \circ f)(x)$
- (c) Compute the composition $(f \circ f^{-1})(x)$

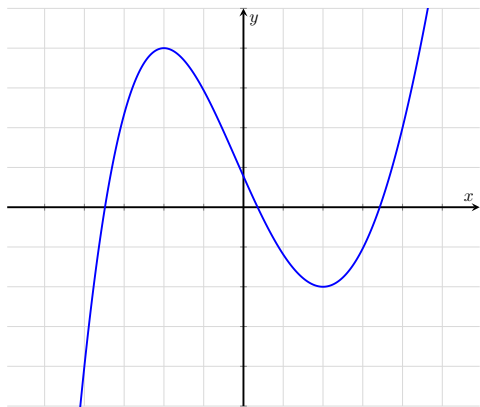
Question 8. Let f be the function given by the table

x	$f(x)$
1	3
2	1
3	4
4	2

- (a) Is f invertible? If so, write a table for the inverse of $f(x)$ (reverse your inputs with your outputs)
- (b) Compute the compositions

$$(f \circ f)(1), \quad (f \circ f \circ f)(1) \quad (f \circ f \circ f \circ f)(1)$$

Question 9. Consider the following function which is drawn below:



Does this function have an inverse? Why or why not?