

Name: _____

1. Find the vertex of the parabola by applying the vertex formula. (4)

$$f(x) = -\frac{1}{2}x^2 + 6x + 9.$$

2. Consider the following quadratic function. (4)

$$f(x) = 25x^2 - 10x + 9$$

- (a) Find the discriminant.

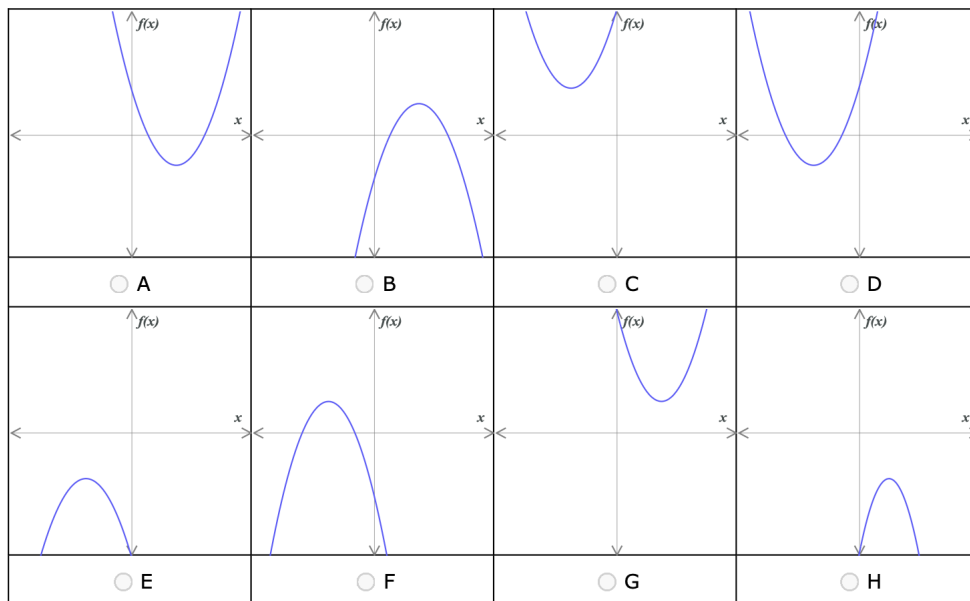
- (b) Based on the discriminant, how many x-intercepts does the graph of f have?

3. Find the zeros of the function and state the multiplicities. (3)

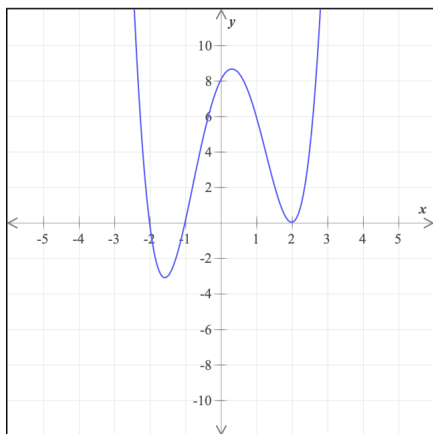
$$t(x) = x^3 + 2x^2 - 16x - 32$$

4. Given a quadratic function defined by $f(x) = a(x - h)^2 + k$, ($a \neq 0$), (3)
match the graph with the function based on the conditions given.

$a < 0$, axis of symmetry $x = 2$, $k > 0$



5. Consider the following graph of a polynomial. (3)



- Determine the minimum degree of the polynomial.
- Determine whether the
 - leading coefficient is positive or negative
 - degree of the polynomial is odd or even.

6. Consider the function.

(8)

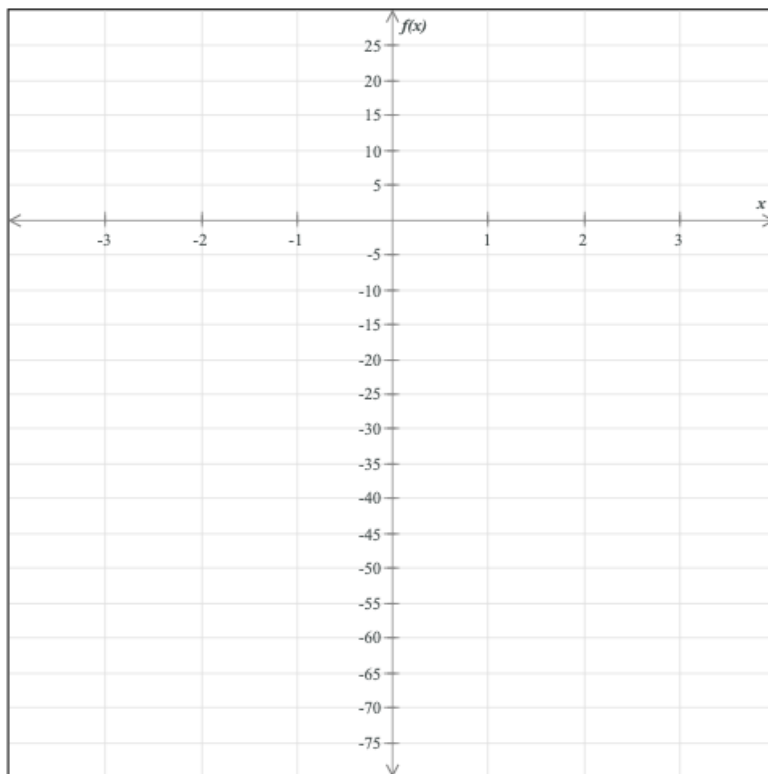
$$f(x) = -x^4 + 13x^2 - 36$$

(a) State the end behavior of the function.

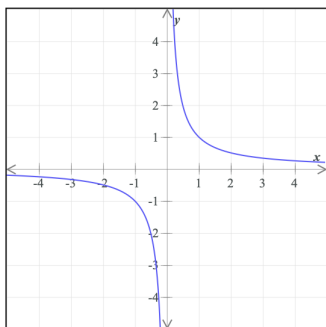
(b) Find y-intercept(s).

(c) Find the real zero(s) of the function.

(d) Sketch the function.



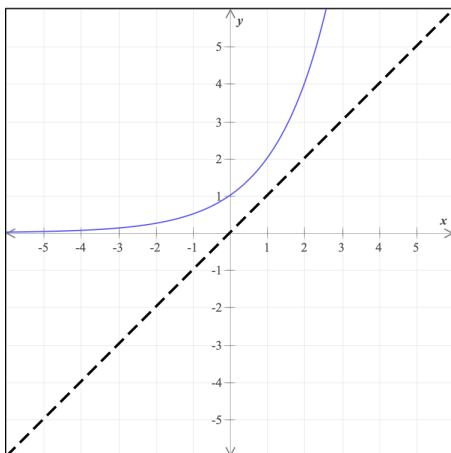
7. Determine if the relation defines y as a one-to-one function of x . (3)



8. A one-to-one function is given. Write an equation for the inverse function. (5)

$$f(x) = \frac{x - 4}{x + 7}$$

9. The graph of a function is given. Graph the inverse function. (3)



10. A function g is given. Identify the parent function. Then use the steps for graphing multiple transformations of functions to list, in order, the transformations applied to the parent function to obtain the graph of g . (5)

$$g(x) = \frac{4}{x+2} - 3$$

11. Write a function based on the given parent function and transformations in the given order. (5)

Parent function: $y = |x|$

1. Shift 4 units to the right.
2. Shrink horizontally by a factor of $\frac{1}{4}$.
3. Reflect across the y -axis.

12. Given the functions:

(8)

$$f(x) = -7x$$

$$g(x) = x - 5$$

$$h(x) = \frac{1}{x+6}$$

Answer the following:

(a) $(f + g)(x)$

(b) $\left(\frac{f}{g}\right)(-5)$

(c) $f \circ g$

(d) $g \circ f$

(e) Domain of $(f \circ h)(x)$

13. Factor the following.

(4)

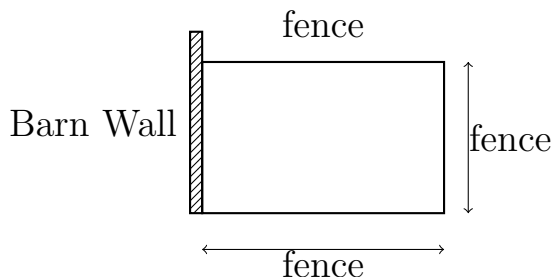
(a) $n^2 - 81$

(b) $x^2 - x - 90$

(c) $3x^2 - 8x - 3$

(d) $3x^{-1/2} + 6x^{1/2}$

14. A farmer has 240 feet of fencing and wants to enclose a rectangular area for grazing cattle. One side of the rectangle will be against an existing barn wall, so fencing is only needed for three sides.



- (a) Let x represent the width of the rectangle (perpendicular to the barn wall) and y represent the length (parallel to the barn wall). Express the area A of the rectangle as a function of x only.
- (c) What are the dimensions of the rectangle that will maximize the enclosed area? Show your work.
- (d) What is the maximum area that can be enclosed? (1 point)

15. Consider the given function $q(x) = 2x^2 - 8x + 7$. (10)

(a) Write the function in vertex form.

(b) Identify the vertex.

(c) Determine the x -intercept(s).

(d) Determine the y -intercept(s).

(e) Determine the axis of symmetry.

(f) Determine the minimum or maximum value of the function.

(g) Write the domain and range in interval notation.