

**Read each question carefully. Give exact answers. Circle your final answer.  
You must show all work on every problem in order to receive full credit.**

1. For  $f(x) = \frac{1}{x}$  and  $g(x) = \sqrt{x}$ , write and find the domain of  $(fg)(x)$ .

2. For  $f(x) = \frac{1}{x}$  and  $g(x) = \sqrt{x-1}$ , write and find the domain of  $(f \circ g)(x)$ .

3. Find the slope-intercept form of the line containing the point  $(2, -5)$  and perpendicular to the line  $y = -\frac{2}{3}x + 19$ .

4. Determine whether the function  $f(x) = -x^3 + \frac{1}{x^5}$  is

a. even, odd, or neither

b. symmetric with respect to the x-axis, y-axis, origin, or none of these

5. For  $f(x) = -4x^2 + x - 3$ , find the following:

a. zeros

b. vertex

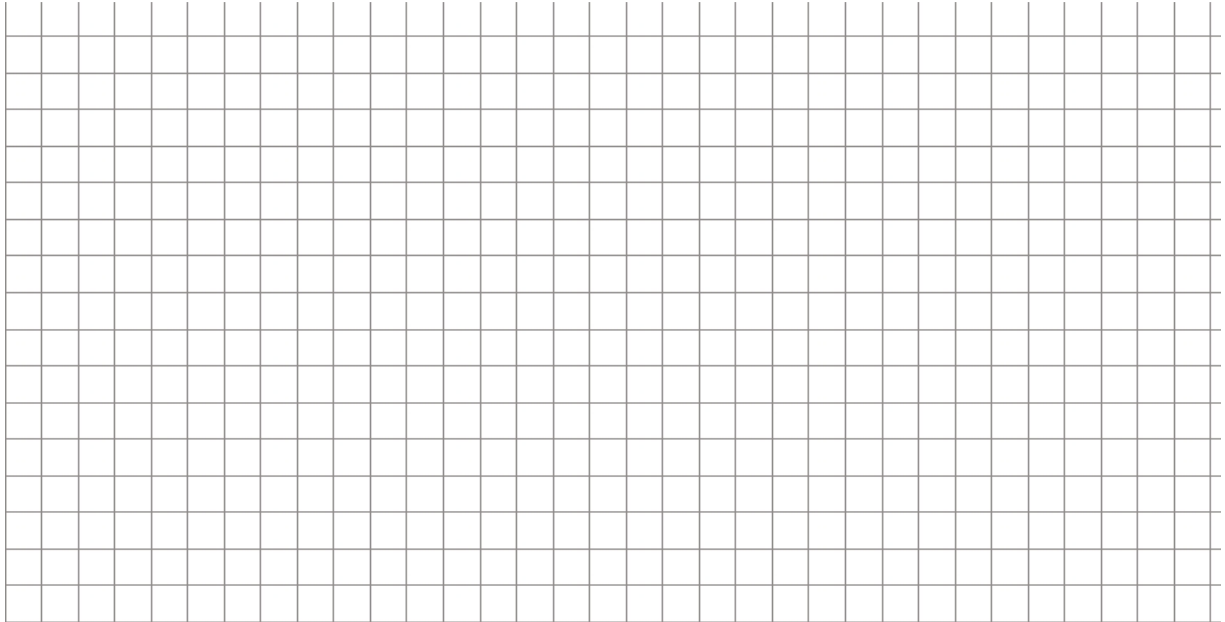
c. axis of symmetry

d. maximum or minimum value

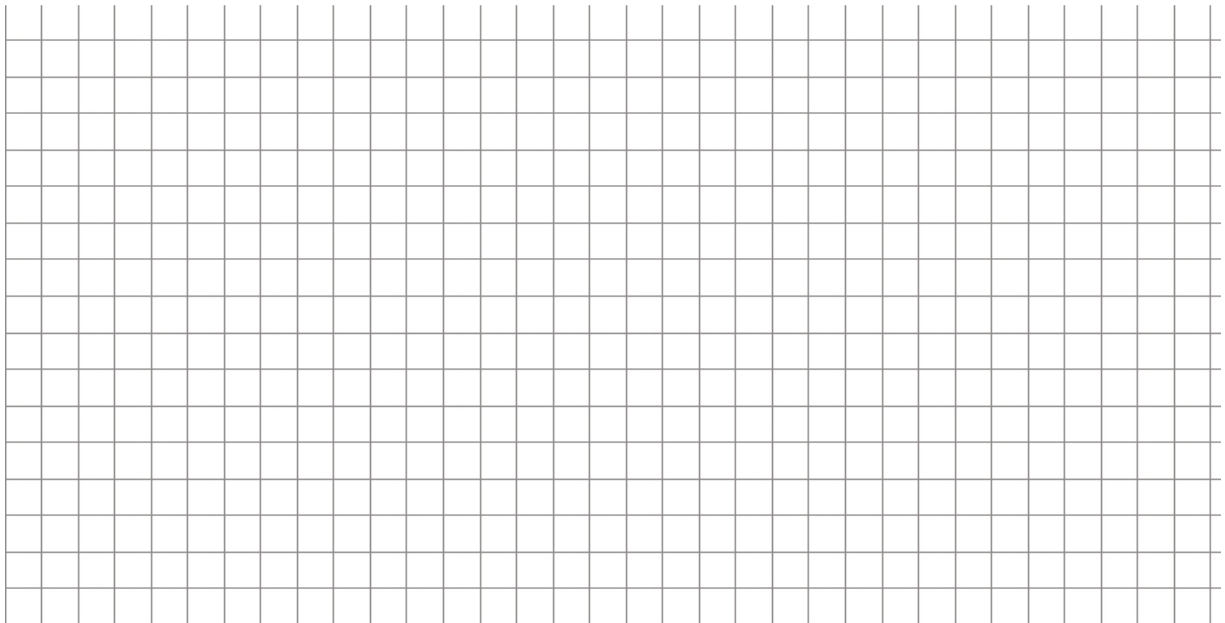
e. intervals over which the function is increasing or decreasing

6. Graph the piecewise function and state the intervals over which the function is increasing, decreasing, or constant.

$$f(x) = \begin{cases} 2x + 1, & x \leq -3 \\ |x| - 2, & -3 < x \leq 2 \\ 5, & x > 2 \end{cases}$$



7. Graph the function  $y = \frac{1}{2}(-x + 3)^3 - 1$  using transformations. Label at least three reference points on your final graph. Hint: what's with that - in front of the x?



8. Write an equation for  $y = \frac{1}{x}$  but stretched vertically by a factor of 3, flipped vertically, shifted right 2 units and shifted up 1 unit.

9. Set up a linear equation to describe the following problem, and then solve the equation. The hare gave the tortoise a 40 meter head start in their race. The tortoise can run about 0.5 meters per second. How long does it take the tortoise to reach the finish line of this 100 meter race?

10. Construct and simplify the difference quotient for  $f(x) = 3x^2 - 2x + 1$ .