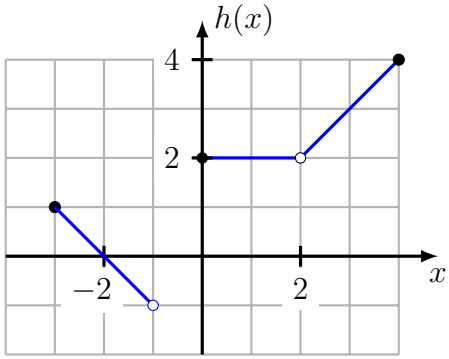
MATH 120
SPRING 2024
EXAM 2

NAME:

1. [10 pts.] Given $f(x) = \dfrac{x^2}{x+1}$, find and simplify $f(-3)$, $f(-x)$, and $f(x+1)$.

2. [10 pts. each] The graph of function $y = h(x)$ is below.
   (a) Find $h(-1)$, $h(2)$, and $h(4)$.
   (b) Find the domain and range of h.



3. [5 pts. each]
   (a) Determine algebraically whether the graph of $x^2y^2 + 5xy = 2$ is symmetric with respect to the x-axis, the y-axis, the origin, more than one of these, or none of these.
   (b) Is the function $R(x) = \dfrac{x^4 - 2x^2 + 3}{x^3}$ even, odd, or neither?

4. [10 pts. each] Define
$$q(x) = \begin{cases} -\frac{1}{2}x^2, & \text{if } x < 2 \\ 2x - 3, & \text{if } x > 2 \end{cases}$$
   (a) Graph $y = q(x)$.
   (b) What is the domain and range of q?

5. [10 pts.] Write the equation of the line passing through $(-3, 1)$ and $(-14, -7)$ in slope-intercept form.

6. [10 pts.] If one point on a line is $(4, -3)$ and the line's slope is $\frac{2}{5}$, what is the y-intercept?

7. [10 pts.] A line L has y-intercept 2 and is perpendicular to the line $y - 4x + 1 = 0$. Find the equation for L in slope-intercept form.

8. [10 pts. each] Find the domain of each function in interval notation.

   (a) $f(x) = \dfrac{4}{x^2 - 16}$

   (b) $r(x) = \dfrac{x - 2}{\dfrac{15}{x} - 5}$

9. [10 pts. each] Let $F(x) = \sqrt{x - 3}$ and $G(x) = \sqrt{2x + 5}$. For what follows find all domains in interval notation.

   (a) Find the domain of F and G separately.

   (b) Find $F - G$ and its domain.

   (c) Find F/G and its domain.

10. Let $f(x) = \sqrt{x}$ and $g(x) = \dfrac{5}{x - 36}$.

    (a) [5 pts.] Find $(f \circ g)(x)$. No need to simplify.

    (b) [10 pts.] Find the domain of $f \circ g$ in interval notation.

11. [10 pts. each] The function $f(x) = \dfrac{7 - 3x}{9x + 2}$ is one-to-one.

    (a) Find an equation for $f^{-1}(x)$.

    (b) Use interval notation to give the domain and range of f and f^{-1}.