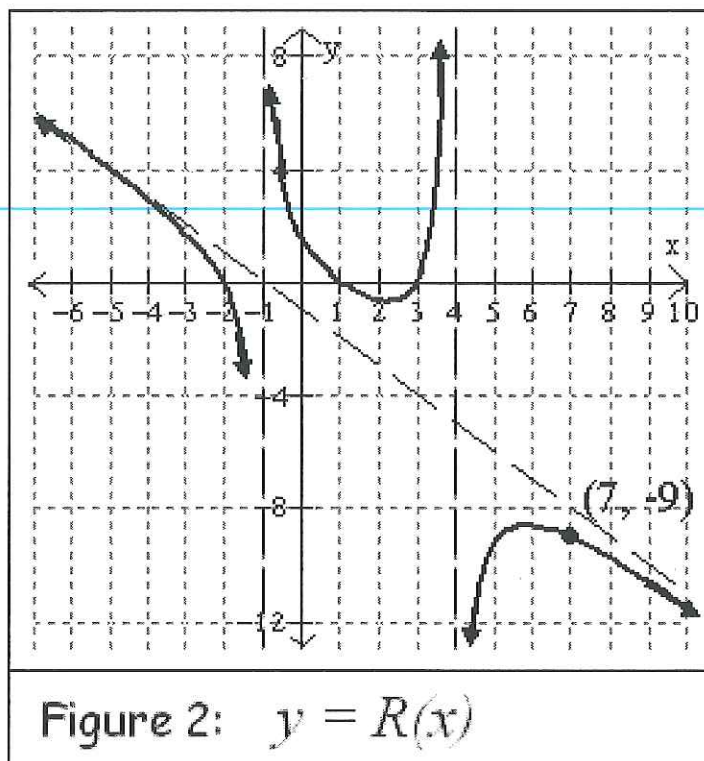
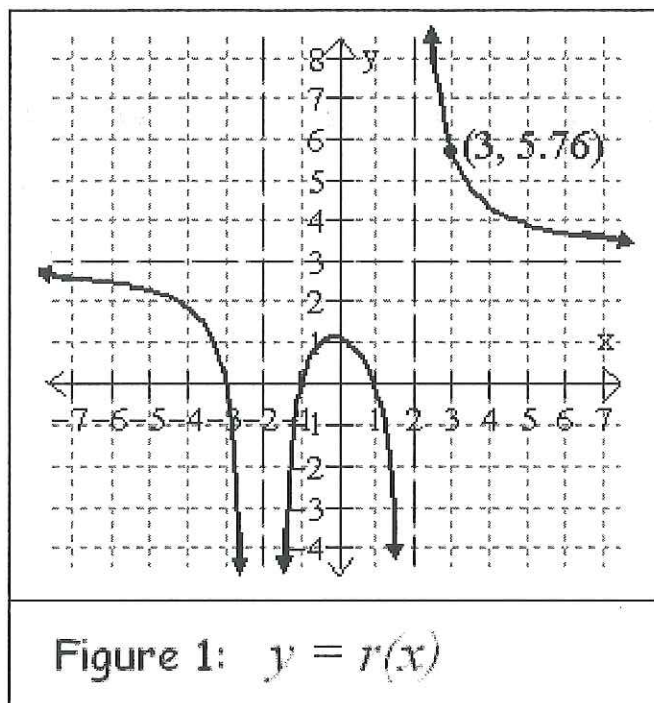


Find possible formulas for the rational functions.



Key for Rational function formula from graph worksheet

1.

- Factors in numerator are from x intercepts
- Factors in denominator are from vertical asymptotes
- Note that the horizontal asymptote is $y = 3$, which means the case is “match.”
 - Since the numerator and denominator should have the same degree, one of the factors in the denominator must be repeated for formula to agree with the graph.
 - Since the graph points in the same direction on both sides of $x = -2$, the $x + 2$ factor must be squared.

$$r(x) = \frac{k(x+3)(x+1)(x-1)}{(x+2)^2(x-2)}$$

- Use the point to $(3, 5.76)$ $5.76 = \frac{k(3+3)(3+1)(3-1)}{(3+2)^2(3-2)}$ additional solve for k :

$$5.76 = \frac{k(6)(4)(2)}{(25)(1)}$$

$$5.76 = \frac{48}{25}k$$

$$3 = k$$

- Conclusion:

$$r(x) = \frac{3(x+3)(x+1)(x-1)}{(x+2)^2(x-2)}$$

2.

- Factors in numerator are from x -intercepts
- Factors in denominator are from vertical asymptotes

- Initial set up: $y = \frac{k(x+2)(x-1)(x-3)}{(x+1)(x-4)}$

- Note that there is no horizontal asymptote on the graph, which means the case is “top-heavy.” The numerator should have a higher degree, and more specifically the degree will be exactly one higher (since there is an oblique asymptote on the graph). Our formula agrees.
- Since the graph points in opposite directions on both sides of each vertical asymptote, the factors in the denominator would not be squared.
- Use the additional point $(7, -9)$ to solve for k :

$$-9 = \frac{k(7+2)(7-1)(7-3)}{(7+1)(7-4)}$$

$$-9 = \frac{k(9)(6)(4)}{(8)(3)}$$

$$-9 = 9k$$

$$-1 = k$$

- Conclusion:

$$R(x) = - \frac{(x+2)(x-1)(x-3)}{(x+1)(x-4)}$$