

Chapter 3 Review

BLM 3-8

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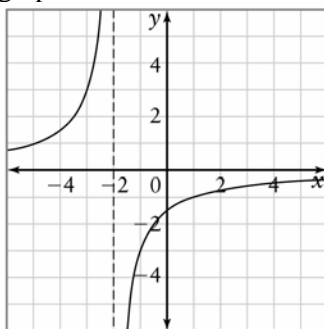
3.1 Reciprocal of a Linear Function

1. Determine the equations for the vertical and horizontal asymptotes of each function.

a) $f(x) = \frac{1}{2x-5}$

b) $g(x) = -\frac{3}{x+5}$

2. Determine an equation to represent the graph of the function.



3. Sketch a graph of each function.

a) $f(x) = \frac{4}{x-2}$

b) $g(x) = -\frac{1}{x+1}$

4. For each function, state
i) the domain and range
ii) the x - and y -intercepts

a) $f(x) = -\frac{5}{4x-7}$

b) $g(x) = \frac{1}{x-5}$

3.2 Reciprocal of a Quadratic Function

5. For each function,
i) determine the equations of the asymptotes
ii) determine the x - and y -intercepts
iii) sketch the graph
iv) state the domain and range
v) list the intervals over which the function is increasing
vi) list the intervals over which the slope of the graph is increasing

a) $f(x) = \frac{1}{(x+2)(x-1)}$

b) $g(x) = -\frac{8}{x^2-4}$

c) $g(x) = \frac{4}{x^2+4}$

6. A function that is the reciprocal of a quadratic function has vertical asymptotes $x = -2$ and $x = 6$. It has a horizontal asymptote $y = 0$ and the function is positive over the interval $(-2, 6)$. Write an equation for this function.

3.3 Rational Functions of the Form

$$f(x) = \frac{ax+b}{cx+d}$$

7. Summarize the key features of each function. Then, sketch a graph of the function.

a) $f(x) = \frac{x-3}{x+2}$

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

8. A function of the form $f(x) = \frac{ax+b}{cx+d}$

has the following features:

• x -intercept -1

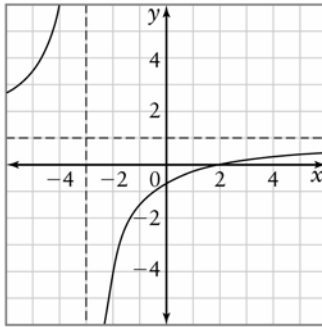
• y -intercept $\frac{3}{2}$

• vertical asymptote $x = -2$

• horizontal asymptote $y = 3$

Determine an equation for this function.

9. Determine an equation of the function whose graph is shown.



3.4 Solve Rational Equations and Inequalities

10. Solve algebraically.

a) $3 = \frac{6}{2x^2 - x - 4}$

b) $\frac{2x-3}{x+5} \geq \frac{2x+7}{x-3}$

11. **Use Technology** Solve each equation using technology. Round your answers to two decimal places, where necessary.

a) $\frac{x^2 - 5}{x + 3} = \frac{2x^2 - x + 1}{3x - 1}$

b) $\frac{x^3 - 6x + 8}{x^2 - x - 2} < 0$

3.5 Making Connections With Rational Functions and Equations

12. The population of a town can be modelled by the function

$$P(t) = 20 \left(\frac{4t + 3}{2t + 5} \right), \text{ where } P \text{ is the}$$

population, in thousands, and t is the time, in years, after the year 2000 ($t > 0$).

- What is the population in the year 2000?
- In what year will the population be 30 000?
- Town planners claim that they need not plan for a population above 40 000. Does the model support this conclusion? Explain.