Lesson 2.2 Math Lab: Assess Your Understanding, page 104

Use graphing technology to check your answers.

1. Without graphing, predict whether the graph of each function has a hole. State the related non-permissible value.

a) $y = \dfrac{x^2 - 16}{x + 4}$

b) $y = \dfrac{x^2 + 5}{x^2 - 25}$

$y = \dfrac{(x - 4)(x + 4)}{x - 4}$

The graph has a hole at $x = -4$.

$y = \dfrac{x^2 + 5}{(x - 5)(x + 5)}$

The graph does not have a hole.

2. Without graphing, predict the equations of any vertical asymptotes for the graph of each function.

a) $y = \dfrac{2x + 1}{x}$

b) $y = \dfrac{x^2 - 2}{x^2 - 16}$

$x = 0$ is a vertical asymptote.

$y = \dfrac{x^2 - 2}{(x - 4)(x + 4)}$

$x = \pm 4$ are vertical asymptotes.

c) $y = \dfrac{3x}{x^2 + 2}$

d) $y = \dfrac{x - 2}{x^2 + 7x + 10}$

The denominator is always positive, so no vertical asymptote.

$y = \dfrac{x - 2}{(x + 2)(x + 5)}$

$x = -2$ and $x = -5$ are vertical asymptotes.

3. Without graphing, predict which graphs of these functions have horizontal asymptotes.

a) $y = \dfrac{x + 3}{2x^2 + 6x}$

b) $y = \dfrac{2x^2 + 6x}{x + 3}$

The degree of the numerator is less than the degree of the denominator, so there is a horizontal asymptote.

The degree of the numerator is greater than the degree of the denominator, so there is no horizontal asymptote.