For problems #1-3, solve the rational equations for the unknown variable. Be sure to check for extraneous solutions.

1. $\dfrac{10}{z} = -3z + 31$

2. $\dfrac{2}{x+5} + \dfrac{6}{x-2} = \dfrac{18}{x^2+3x-10}$

3. $\dfrac{x+4}{x-3} = \dfrac{x-6}{x+8}$

4. Find the domain of the function. $f(x) = \dfrac{x-5}{x-2}$

5. Which values, if any, cause $f(x) = \dfrac{4x+7}{x^2+6x+8}$ to be undefined?

6. Determine the horizontal and vertical asymptotes, if any, of the function $f(x) = \dfrac{2x^2+9}{5x^2+2}$.
Show all work!

7. Sketch the graph of the rational function. State the x- and y-intercepts, vertical and horizontal asymptotes and holes of the graph. If there aren't any for this function, write *none*.

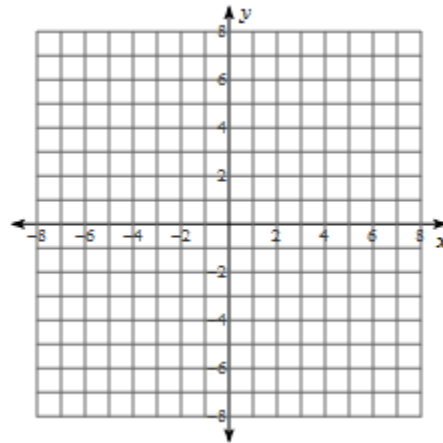$$f(x) = \frac{x + 7}{x^2 - 7x + 12}$$

Vertical Asymptote(s):

Hole(s):

Horizontal Asymptote:

x-intercept(s):

y-intercept:

8. Write a rational function that would have a vertical asymptote at $x = 3$ and a horizontal asymptote at $y = \frac{1}{2}$.

The senior class is planning the Prom. The band costs $600, the rental of a hotel ballroom is $300, and the cost of beverages is $100. The hotel will charge an additional $20 per person for food. Based on a lottery, ten couples will be allowed to attend the Prom at no charge.

a. Write an equation that expresses the cost per paying student (y) in terms of the total number of students (x).

b. If each paying guest paid $30.00, how many guests attended Prom?