Review Rational Functions Name_________________________ Date________________ Period____

- **Find the x and y intercepts**
- **Find the domain**
- **Plot specific points on each graph**
- **Each item should be written as an equation or coordinate pair.**
- **Find any horizontal, vertical or slant asymptotes**
- **Find any holes**
- **If one of the parts does not exist put NONE.**

Create an equation that satisfies the conditions:

1. A rational function with asymptotes:
x = –2, x = 1, and y = 3

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

2. A rational function with asymptotes:
x = 9, and y = 0

$$f(x) = \frac{1}{(x-9)}$$

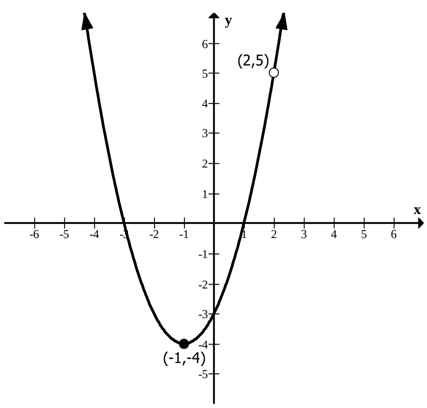
3. A rational function with asymptotes:
x = –3, x = 4, and y = 1 and x intercepts (2, 0) and (3, 0)

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

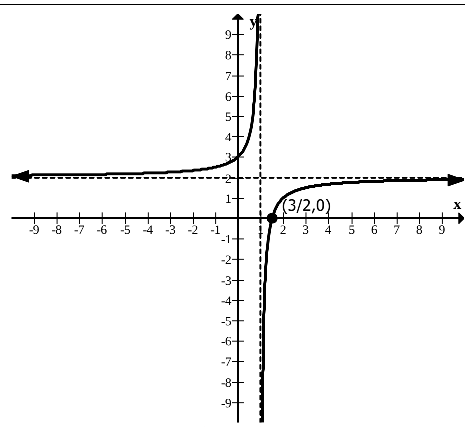
4. A rational function with no vertical asymptotes and a y – intercept of 3

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

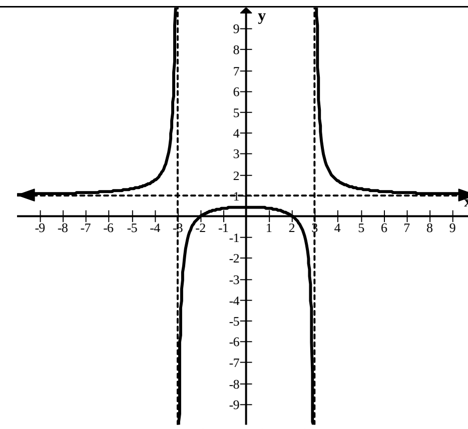
5. Find the equation for each rational function.



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



$$f(x) = \frac{(2x-3)}{(x-1)}$$



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

6. True or False. Explain your answer.

a) A rational function can have a vertical, horizontal, and slant asymptotes.

False a rational function will have a horizontal or a slant asymptote but not both.

b) It is possible to have a rational function with no y-intercept and no vertical asymptote.

True. The function would need to have a hole at x =0. $f(x) = \frac{x}{x(x^2+1)}$

c) A rational function can cross a vertical asymptote but not a horizontal asymptote.

False, a rational function can cross a horizontal asymptote but not a vertical one.

d) Transforming a rational function 5 units to the right that has asymptotes of x = 3 and y = 2 will result in asymptotes at x = 8 and y = 7.

False translating the function 5 units to the right will move the vertical asymptote 5 to the right x = 8 but will not affect the horizontal asymptote.

e) The domain of a rational function will exclude the values of the vertical asymptotes and the holes.

True. If there is a vertical asymptote or a hole the function is undefined at that x value.

7. It will cost $95,000 for research and development of a new computer game. Once completed, individual games can be produced for just $1.55 each. If the first 275 disks are the given away as samples, the function $C(x) = \frac{1.55x+95{,}000}{x-275}$ determines the average production cost per disk where x is the total number of games produced.

A. How many disks should be produced, so you can charge $20 per disk?

Solve 20 $= \frac{1.55x+95{,}000}{x-275}$ should give you 5448 disks

B. What is the minimum cost per disk?

$1.55

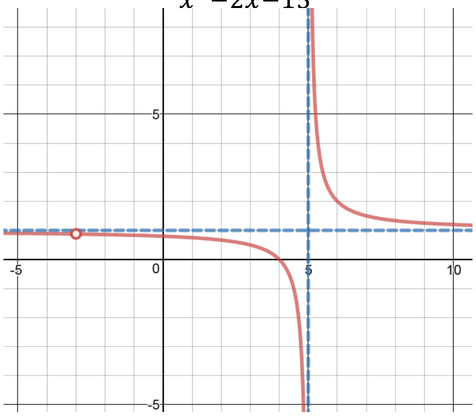
8. Imagine that you own a T-shirt business. The cost of creating the design and purchasing printing supplies is \$800. In addition, the cost of each T-shirt is \$4.75. The average cost per T-shirt for the business to manufacture x T-shirts is $C(x) = \frac{4.75x+800}{x}$.

A. Find the average cost per T-shirt when x =100, 1000, and 10,000.

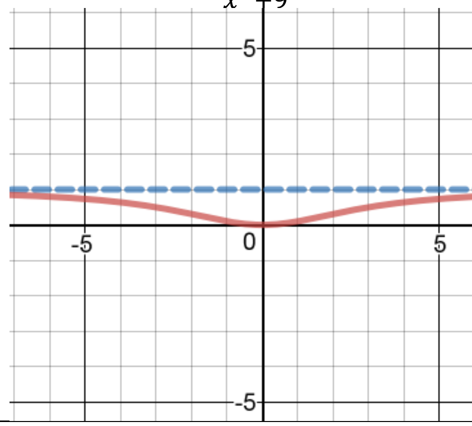
If x = 100: \$12.75, if x = 1000: \$5.55, and if x = 10,000: \$4.83).

B. What is the minimum cost per T-shirt? The horizontal asymptote \$4.75

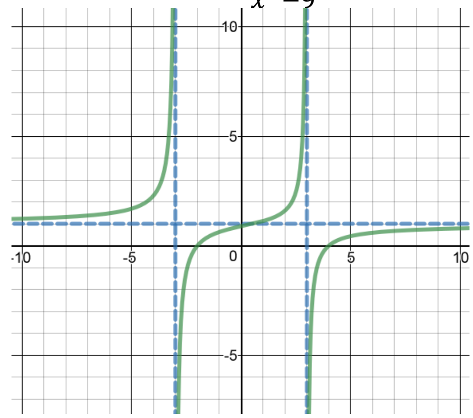
9. $f(x) = \frac{x^2-x-12}{x^2-2x-15}$



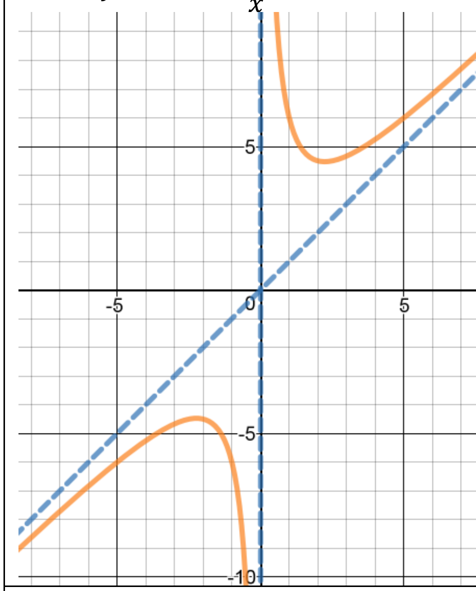
10. $f(x) = \frac{x^2}{x^2+9}$



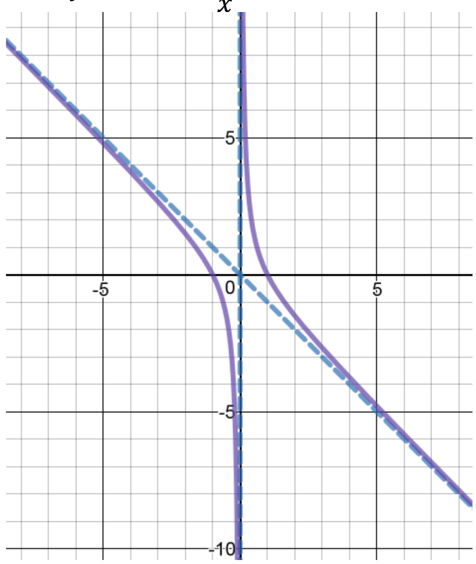
11. $f(x) = \frac{x^2-2x-8}{x^2-9}$



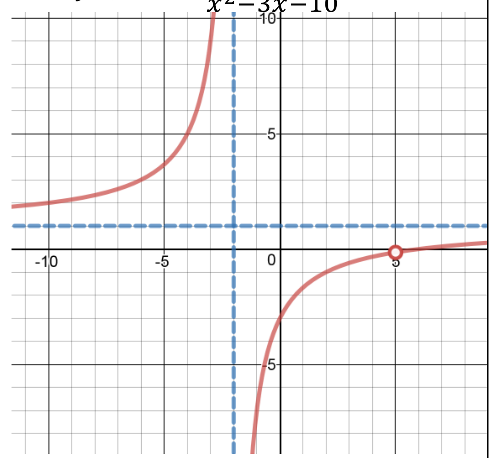
12. $f(x) = \frac{x^2+5}{x}$



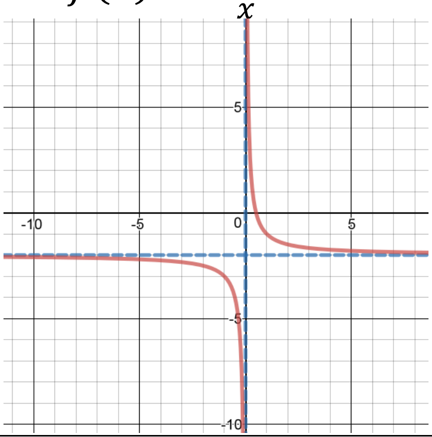
13. $f(x) = \frac{1-x^2}{x}$



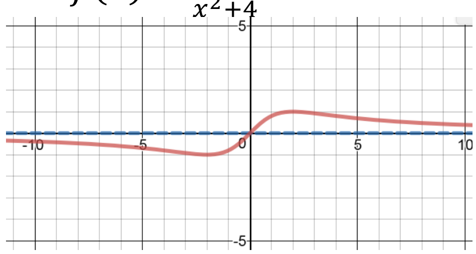
14. $f(x) = \frac{x^2-11x+30}{x^2-3x-10}$



15. $f(x) = \frac{1-2x}{x}$



16. $f(x) = \frac{4x}{x^2+4}$



17. $f(x) = \frac{1}{(x-3)^2}$