Precalculus
2.7 Homework

For each rational function, do the following:

a) **Write the function with the numerator and denominator completely factored.**
b) **State the domain.**
c) **Write the function in simplest form.**
d) **Find the *x*- and *y*-intercepts.**
e) **Find any holes.**
f) **Find the vertical asymptotes.**
g) **Find the horizontal or oblique asymptote or the higher-degree function that the ends approach.**
h) **Neatly draw the graph of the function. Label at least 3 points on the graph.**

1. $R(x)=\dfrac{x+1}{x(x+4)}$

2. $R(x)=\dfrac{2x+4}{x-1}$

3. $R(x)=\dfrac{6}{x^2-2x-8}$

4. $R(x)=\dfrac{x^2+x-12}{x^2-x-6}$

5. $R(x)=\dfrac{x^4-1}{x^2-4}$ Hint: x^4-1 is a difference of squares

6. $G(x)=\dfrac{2-x}{(x-1)^2}$

7. $H(x)=\dfrac{x^3-1}{x^2-9}$ Hint: $A^3-B^3=(A-B)(A^2+AB+B^2)$

8. $H(x)=\dfrac{2x^2+2x-4}{x^2+3x-4}$

9. $R(x)=\dfrac{-4}{(x+1)(x^2-9)}$

10. $F(x)=\dfrac{x^2-3x-4}{x+2}$

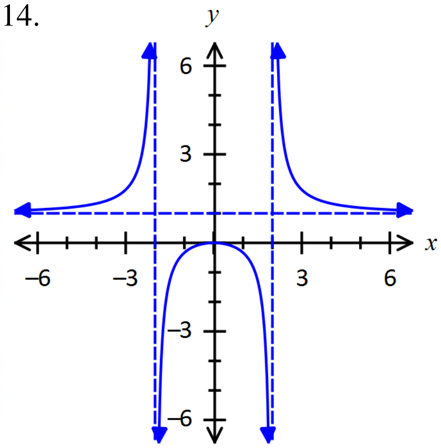
11. $F(x)=\dfrac{6x^2-x-15}{2x^2-x-6}$

12. $G(x)=\dfrac{x^2-x-12}{x+1}$

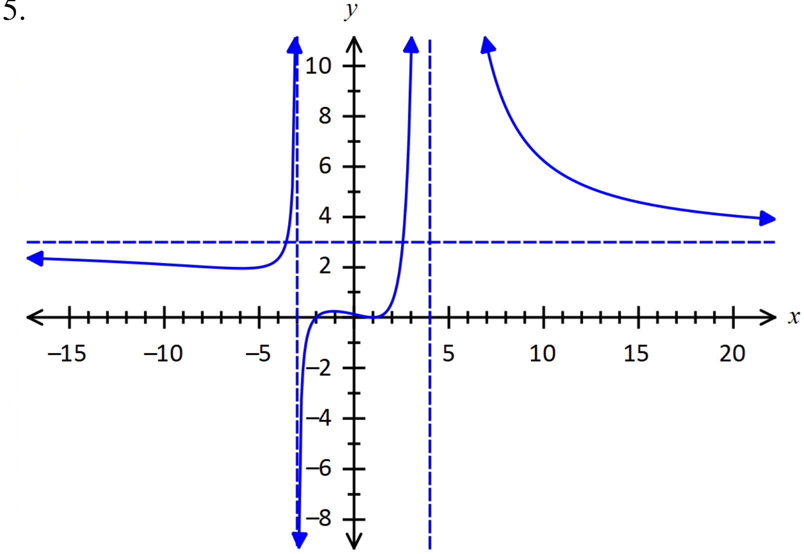
13. $R(x)=\dfrac{-3x+6}{x^2-4}$

Write an equation for a rational function that might have the given graph.

14.



15.

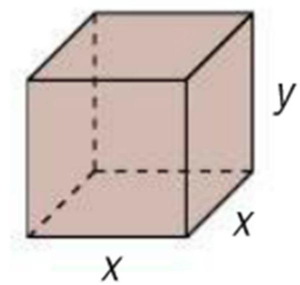


16. The concentration C of a certain drug in a patient's bloodstream t minutes after injection is given by

$$C(t) = \frac{50t}{t^2 + 25}$$

a) Find the horizontal asymptote of $C(t)$. What happens to the concentration of the drug as t increases?
b) Using your graphing calculator, graph $C(t)$.
c) Using your graphing calculator, determine when the concentration of the drug is the highest.

17. UPS has hired you to design a closed box with a square base that has a volume of 10,000 cubic inches. See the illustration.



a) Express the surface area A of the box as a function of x.
b) Using your graphing calculator, graph $A(x)$.
c) What is the minimum amount of cardboard that can be used to construct the box?
d) What are the dimensions of the box that minimize the surface area?