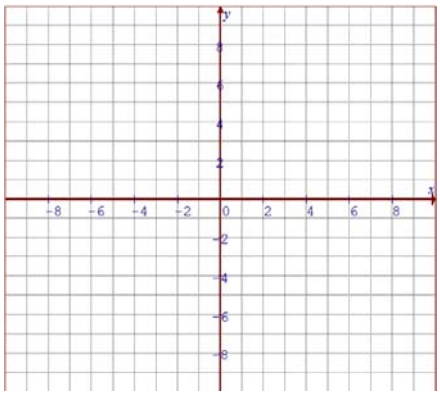
Name:_____ Date:_____

Math 10/11 Enriched: Section 5.2 Graphing Rational Functions and Applications

1. Given each equation below, graph it on the grid provided. Label all max. & min. points:

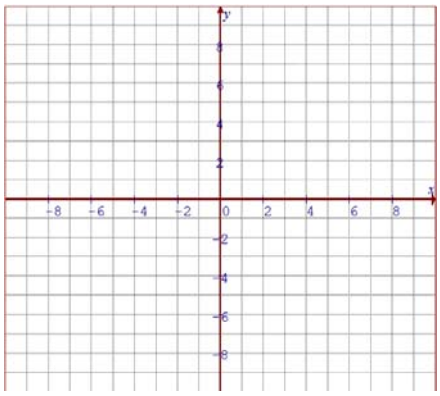
a) $y=\frac{4x}{x^2+1}$



Asymptotes:

D: R:

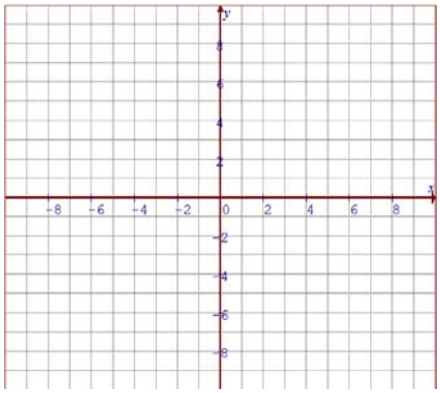
b) $y=\frac{x^2}{x^2-4}$



Asymptotes:

D: R:

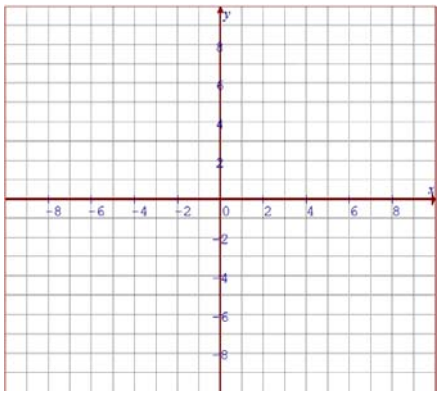
c) $y=\frac{x^2}{x-5}$



Asymptotes:

D: R:

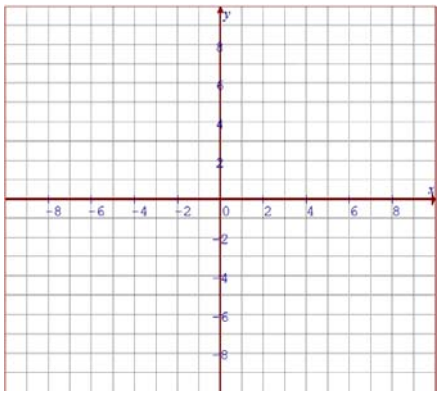
d) $y=\frac{x^2-9}{x-3}$



Asymptotes:

D: R:

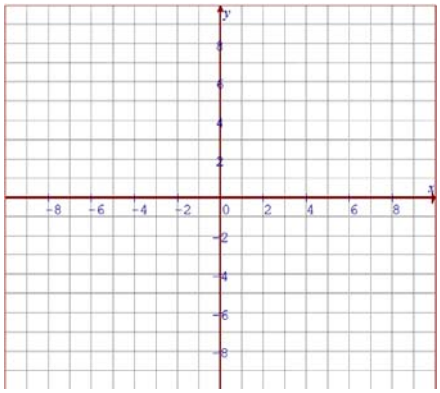
e) $y=\frac{-4x}{x^2+1}$



Asymptotes:

D: R:

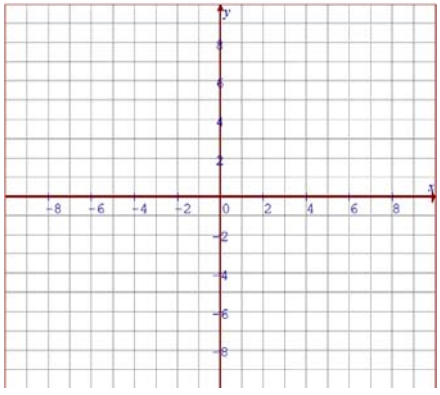
f) $y=\frac{x^2}{x^2-2}$



Asymptotes:

D: R:

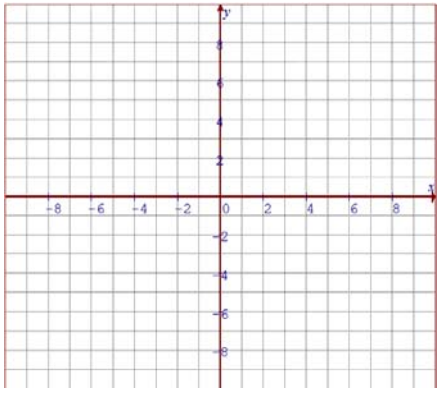
g) $y=\frac{x^3-3x^2}{x-3}$



Asymptotes:

D: R:

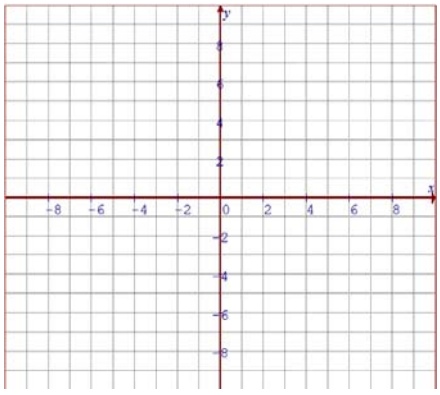
h) $y=\frac{x^2+4}{x}$



Asymptotes:

D: R:

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

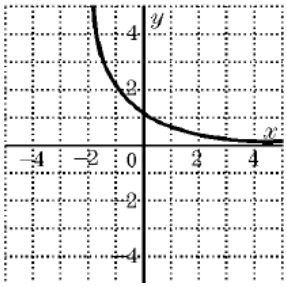


Asymptotes:

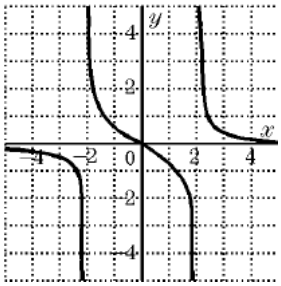
D: R:

2. Indicate which of the following graphs are rational functions only. If not, indicate what kind of function it is. If it is, indicate the general formula of the function and draw all the asymptotes:

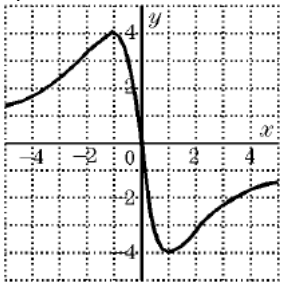
a)



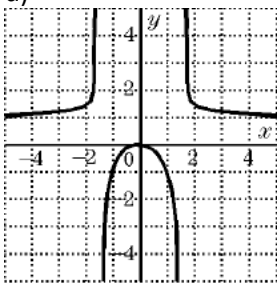
b)



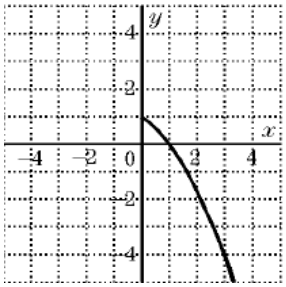
c)



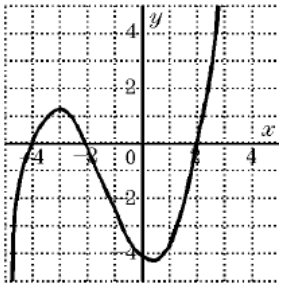
d)



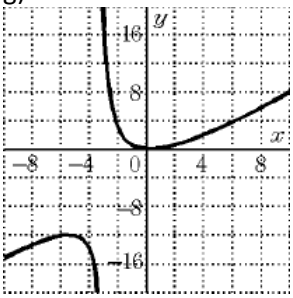
e)



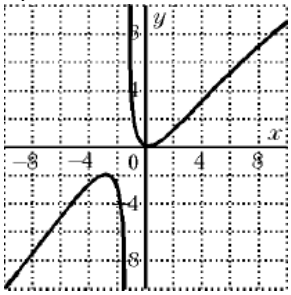
f)



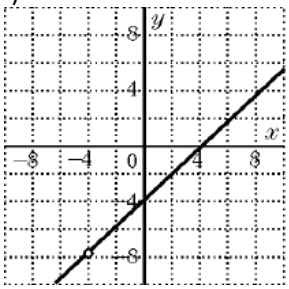
g)



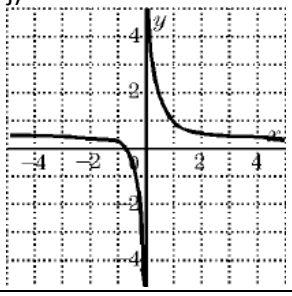
h)



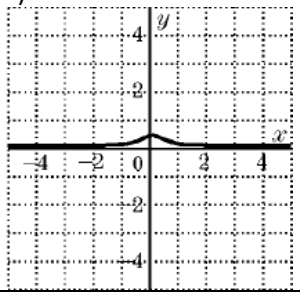
i)



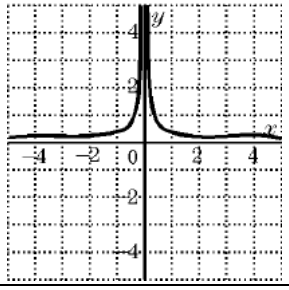
j)



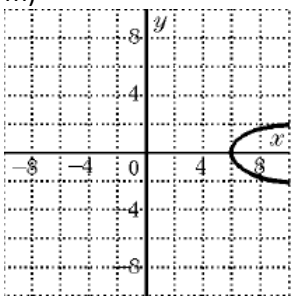
k)



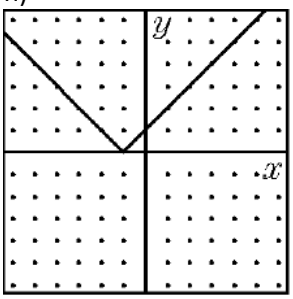
L)



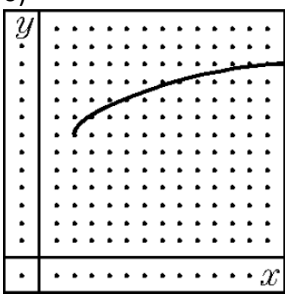
m)



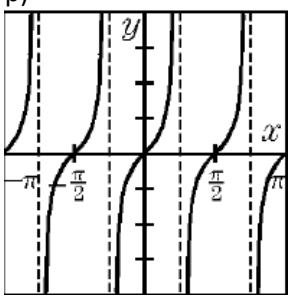
n)



0)



p)



3. Indicate whether if the statement is A) Always True B) Sometimes True C) False

i) All polynomial functions are rational functions: _____

ii) All rational functions are polynomial functions: _____

iii) All reciprocal functions are rational functions: _____

iv) Rational functions have more than one asymptotes: _____

4. The average cost "A" dollars, of printing the school agenda is given by the equation: $A = \frac{2500 + 1.25n}{n}$, where "n" is the number printed.
    a. Graph the function $0 \le n \le 900$
    b. Determine the average cost when 500 agendas are printed
    c. Determine the number of agendas are printed when the average cost is $8.00?

5. A packaging company makes boxes with sides 16.5cm, and a volume approximately 1050cm^3. The company plans to redesign the boxes with a smaller base. The boxes must still have a square base and contain the same volume.
    a. Calculate the height of the box
    b. Let "x" centimeters represent the change in the length of the base. Let "h" centimeters represent the change in height. Write "h" as a function of "x"
    c. Graph the function

6. On the way from Vancouver to Seattle, the speed limit is 110km/h. Since the distance between the cities is approximately 230km, a trip between the two cities is about 2.1hours (Excluding border wait time). Cars travelling faster can reach their destination within 2.1 hours.
    a. Let "s" represent the change in speed compared with 110km/h. Let "t" represent the change in time compared with 2.1hrs. Write "t" as a function of "s"
    b. How much time will you save driving at 125km/h?
    c. At what speed does it take to save 10min?
    d. Graph "t" against "s"

7. Find all the vertical and horizontal asymptotes for each of the following rational functions:

a) $y = \frac{1}{x+3}$	b) $y = \frac{3x}{x+4}$
c) $y = \frac{1}{x^2+x-42}$	d) $y = \frac{x^2}{x^2-16}$
e) $y = \frac{x}{x^2+3}$	f) $y = \frac{x^3}{6x^2-x-2}$

g) $y=\dfrac{2x^2+5x-3}{9-x^2}$	h) $y=\dfrac{3x^4-27x^2}{x^3-3x^2-4x}$

8. What are the vertical asymptote and horizontal asymptote for $f(x)=\dfrac{\sqrt{x}}{x+4}$?

9. Find all the vertical asymptotes for $f(x)=\dfrac{2x^3+12x^2+22x+12}{x^2+6x+8}$

10. Consider the function: $f(x)=\dfrac{x^2+x-6}{2x^2+7x+3}$. If "h" is the number of horizontal, "v" is the number of vertical, and "s" the number of slant asymptotes, what is the ordered triple (h,v,s)?

11. How many vertical asymptotes does $f(x)=\dfrac{4}{x^2+1}$ have?

12. The graph of $y=\dfrac{3x^3+x^2+4}{x^2-48}$ in the cartesian plane has asymptotes $x=a$, $x=b$, and $y=cx+d$. Evaluate the value of $a\times b\times c\times d$.

13. How many integers are in the range of the function $f(x)=\dfrac{4x^2+75}{2x^2+3}$?

14. The function "f' is defined by: $f(x)=\dfrac{ax+b}{cx+d}$ where a, b, c, and d are non-zero real integers and have the properties: $f(19)=19$, $f(97)=97$, and $f(f(x))=x$ for all values of "x" except $\dfrac{-d}{c}$. Find the unique number that is not in the range of "f" (AIME)

15. Challenge: Let $f(x)=\sqrt{ax^2+bx}$. For how many real values "a" is there at least one positive value of "b" for which the domain of "f" and the range of "f" are the same set? AMC 12 2003 #25