Summer Calculus Packet

Name_____

Find the correct end behavior diagram for the given polynomial function.

1) $f(x) = 3x^3 + 4x^2 - 8x + 4$

A)  B)  C)  D)

2) $f(x) = -x^6 + 9x^5 - x^2 - 2x + 3$

A)  B)  C)  D)

3) $f(x) = -\frac{1}{5}x^3 + 5x^2 + 9x - 5$

A)  B) C) D)

4) $f(x) = \sqrt{2}x^6 - x^5 + 4x^2 - 4$

A)  B)  C)  D)

State the domain of the rational function in interval notation.

5) $f(x) = \frac{1}{x}$

6) $f(x) = \frac{7x - 6}{4x + 32}$

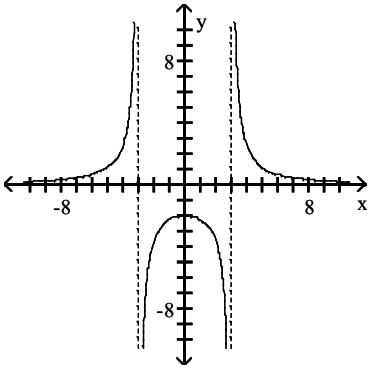
7) $f(x) = \dfrac{x - 9}{x^2 + 9}$

8) $f(x) = \dfrac{(x - 9)(x + 6)}{x^2 - 1}$

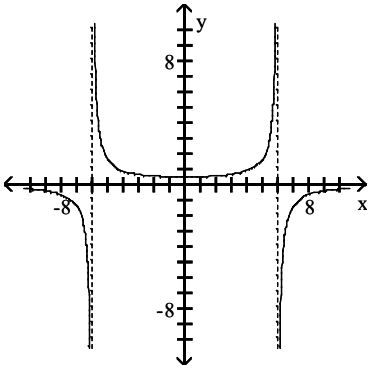
Match the equation with the appropriate graph.

9) $f(x) = \dfrac{18}{x^2 - 9}$

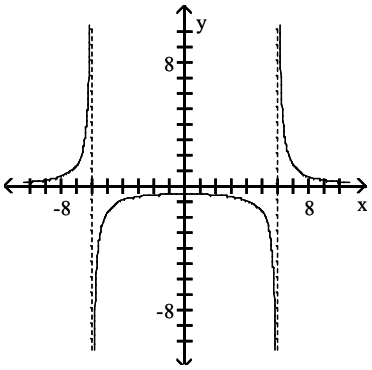
A)



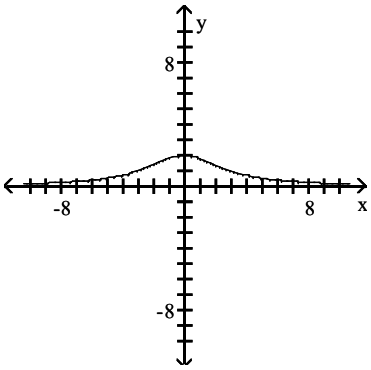
B)



C)

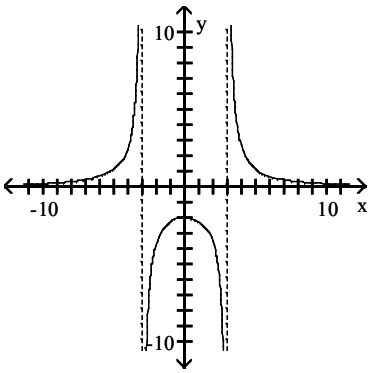


D)

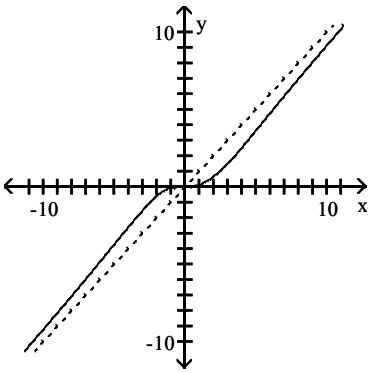


10) $f(x) = \dfrac{x^3}{x^2 + 9}$

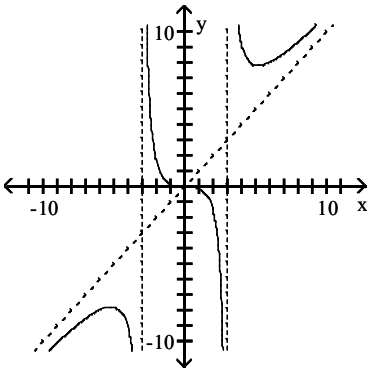
A)



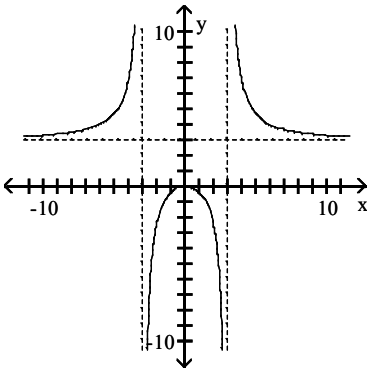
B)



C)

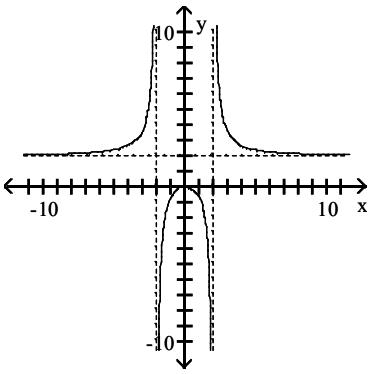


D)

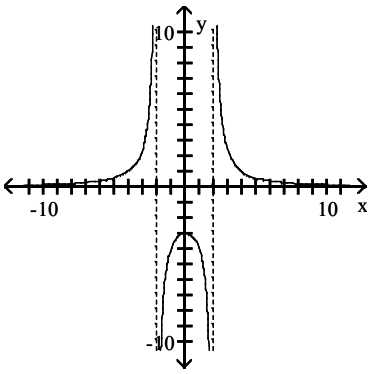


11) $f(x) = \dfrac{2x^2}{x^2 - 4}$

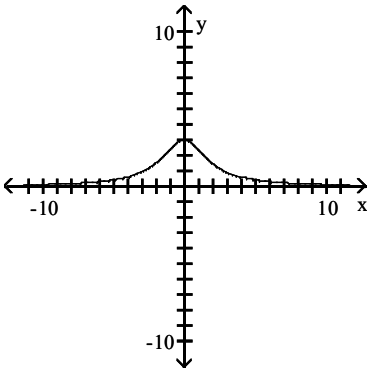
A)



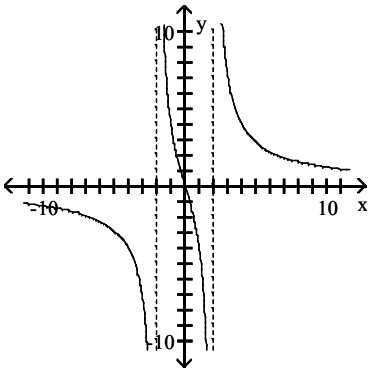
B)



C)



D)



Find the vertical asymptote(s) of the graph of the given function.

12) $y = \dfrac{8}{x}$

13) $g(x) = \dfrac{x + 6}{x - 9}$

14) $f(x) = \dfrac{x^2 + 4x}{x^2 - 5x - 36}$

Find the horizontal asymptote, if any, of the rational function.

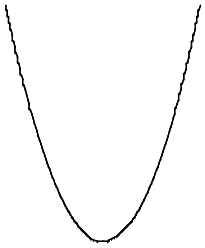
15) $f(x) = \dfrac{5}{x^2 + 2}$

16) $f(x) = \dfrac{x^2 + 9x + 6}{2 - x^2}$

17) $f(x) = \dfrac{x^2 + 5x - 9}{x - 9}$

Match the graph to the function listed whose graph most resembles the one given.

18)



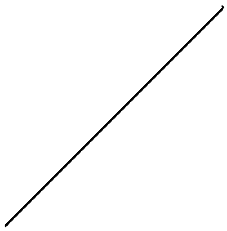
A) cube function
B) reciprocal function
C) square function
D) absolute value function

19)

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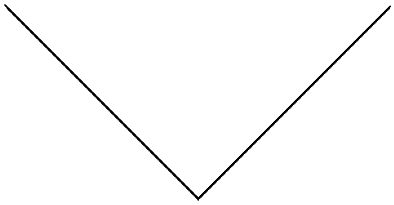
A) absolute value function
B) constant function
C) reciprocal function
D) linear function

20)



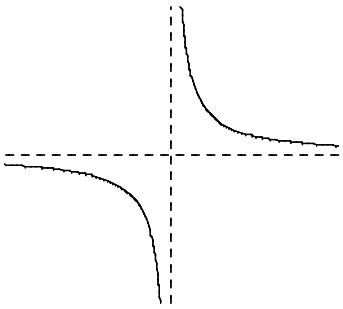
A) reciprocal function
B) linear function
C) constant function
D) absolute value function

21)



A) reciprocal function
B) square function
C) linear function
D) absolute value function

22)



A) square function
B) absolute value function
C) reciprocal function
D) square root function

Find and simplify the difference quotient of f, $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$, for the function.

23) $f(x) = 8x - 1$

24) $f(x) = 3x^2$

25) $f(x) = 5$

Factor the polynomial by removing the common monomial factor.

26) $7x^2 - 49x$

Factor the difference of two squares.

27) $x^2 - 36$

28) $49x^2 - 16$

Factor completely. If the polynomial cannot be factored, say it is prime.

29) $3x^2 - 108$

Factor the perfect square.

30) $x^2 + 20x + 100$

Factor the polynomial by grouping.

31) $x^2 + 3x + 5x + 15$

Factor the polynomial.

32) $x^2 - x - 30$

33) $x^2 - 4x - 45$

Find the slope of the line that goes through the given points.

34) (1, –5), (7, 7)

35) (5, 0), (0, 3)

36) (3, –5), (–3, 6)

Use the slope–intercept form of the linear equation to write the equation of the line with the given slope and y–intercept.

37) Slope $\frac{2}{5}$; y–intercept (0, 1)

38) Slope $\frac{5}{4}$; y–intercept (0, 0)

Solve the problem.

39) The number of mosquitoes M(x), in millions, in a certain area depends on the June rainfall x, in inches: $M(x) = 12x - x^2$. What rainfall produces the maximum number of mosquitoes?

40) A projectile is thrown upward so that its distance above the ground after t seconds is $h = -10t^2 + 420t$. After how many seconds does it reach its maximum height?

41) A developer wants to enclose a rectangular grassy lot that borders a city street for parking. If the developer has 344 feet of fencing and does not fence the side along the street, what is the largest area that can be enclosed?