

1. Explain the meaning of each of the following.

A.)  $\lim_{x \rightarrow -3} f(x) = \infty$

$f(x)$  has a vertical asymptote at  $x = -3$

B.)  $\lim_{x \rightarrow 4^+} f(x) = -\infty$

$f(x)$  has a vertical asymptote at  $x = 4$

2-9: Determine the infinite limit.

2.  $\lim_{x \rightarrow -3^+} \frac{x+2}{x+3} = -\infty$

(test  $x = -2.9$ )

3.  $\lim_{x \rightarrow -3^-} \frac{x+2}{x+3} = \infty$

4.  $\lim_{x \rightarrow 1} \frac{2-x}{(x-1)^2} = \infty$

5.  $\lim_{x \rightarrow 5^-} \frac{e^x}{(x-5)^3} = -\infty$

6.  $\lim_{x \rightarrow 3^+} \ln(x^2 - 9) = -\infty$

7.  $\lim_{x \rightarrow \pi^-} \cot x = -\infty$

8.  $\lim_{x \rightarrow 2^-} \frac{x^2 - 2x}{x^2 - 4x + 4} = -\infty$

9.  $\lim_{x \rightarrow 2^+} \frac{x^2 - 2x - 8}{x^2 - 5x + 6} = \infty$

10. Explain the meaning of each of the following.

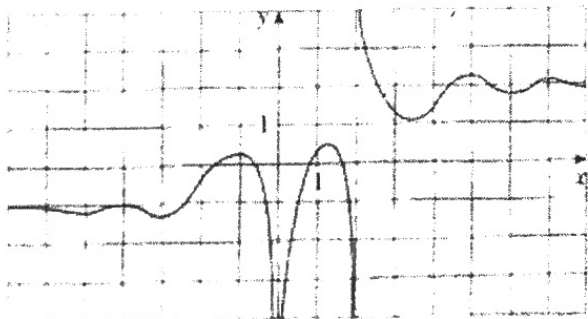
A.)  $\lim_{x \rightarrow \infty} f(x) = 5$

$f(x)$  has a horizontal asymptote of  $y = 5$

B.)  $\lim_{x \rightarrow -\infty} f(x) = 3$

$f(x)$  has a horizontal asymptote at  $y = 3$

11.



A.)  $\lim_{x \rightarrow \infty} g(x) = 2$

B.)  $\lim_{x \rightarrow -\infty} g(x) = -1$

C.)  $\lim_{x \rightarrow 0} g(x) = -\infty$

D.)  $\lim_{x \rightarrow 2^+} g(x) = \infty$

E.)  $\lim_{x \rightarrow 2^-} g(x) = -\infty$

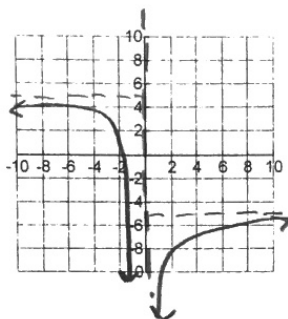
F.) The equation of the asymptotes.

VA:  $x = 0$   $x = 2$

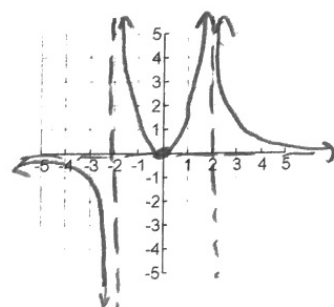
HA:  $y = 2$   $y = -1$

12-17: Sketch the graph of a function  $f$  that satisfies all of the given conditions.

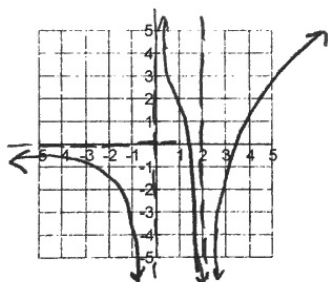
12.  $\lim_{x \rightarrow 0} f(x) = -\infty$   
 $\lim_{x \rightarrow -\infty} f(x) = 5$   
 $\lim_{x \rightarrow \infty} f(x) = -5$



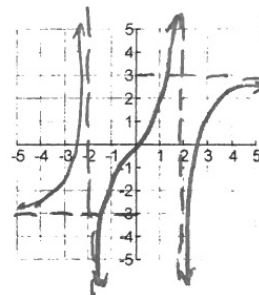
13.  $\lim_{x \rightarrow 2} f(x) = \infty$   
 $\lim_{x \rightarrow -2^+} f(x) = \infty$   
 $\lim_{x \rightarrow -2^-} f(x) = -\infty$   
 $\lim_{x \rightarrow -\infty} f(x) = 0$   
 $\lim_{x \rightarrow \infty} f(x) = 0$   
 $f(0) = 0$



14.  $\lim_{x \rightarrow 2} f(x) = -\infty$   
 $\lim_{x \rightarrow \infty} f(x) = \infty$   
 $\lim_{x \rightarrow -\infty} f(x) = 0$   
 $\lim_{x \rightarrow 0^+} f(x) = \infty$   
 $\lim_{x \rightarrow 0^-} f(x) = -\infty$



15.  $\lim_{x \rightarrow \infty} f(x) = 3$   
 $\lim_{x \rightarrow 2^-} f(x) = \infty$   
 $\lim_{x \rightarrow 2^+} f(x) = -\infty$   
 $f$  is odd



16.  $f(0) = 3$   
 $\lim_{x \rightarrow 0^-} f(x) = 4$   
 $\lim_{x \rightarrow 0^+} f(x) = 2$   
 $\lim_{x \rightarrow -\infty} f(x) = -\infty$   
 $\lim_{x \rightarrow 4^-} f(x) = -\infty$   
 $\lim_{x \rightarrow 4^+} f(x) = \infty$   
 $\lim_{x \rightarrow \infty} f(x) = 3$

17.  $\lim_{x \rightarrow 3} f(x) = -\infty$   
 $\lim_{x \rightarrow \infty} f(x) = 2$   
 $f(0) = 0$   
 $f$  is even

