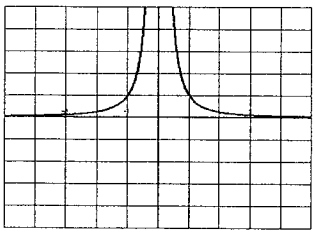
Part 1: State the left and right end behavior of the graphs below using limit notation:

1.

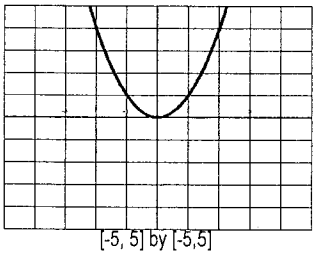


[-5, 5] by [-5,5]

LEB: $\lim_{x \to -\infty} f(x) = 0$

REB: $\lim_{x \to \infty} f(x) = 0$

2.

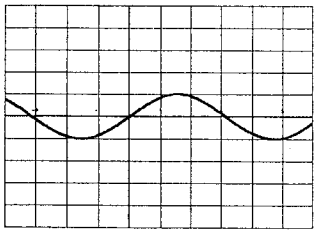


[-5, 5] by [-5,5]

LEB: $\lim_{x \to -\infty} f(x) = \infty$

REB: $\lim_{x \to \infty} f(x) = \infty$

3.

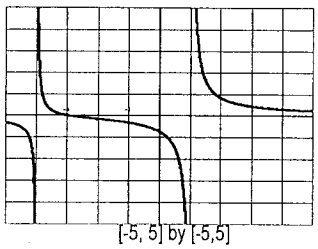


[-5, 5] by [-5,5]

LEB: $\lim_{x \to -\infty} f(x) =$ does not exist

REB: $\lim_{x \to \infty} f(x) =$ DNE

4.

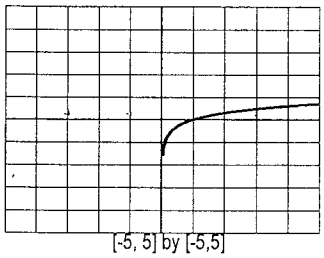


[-5, 5] by [-5,5]

LEB: $\lim_{x \to -\infty} f(x) = 0$

REB: $\lim_{x \to \infty} f(x) = 0$

5.

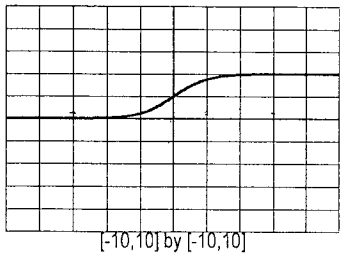


[-5, 5] by [-5,5]

LEB: $\lim_{x \to -\infty} f(x) =$ DNE

REB: $\lim_{x \to \infty} f(x) = \infty$

6.

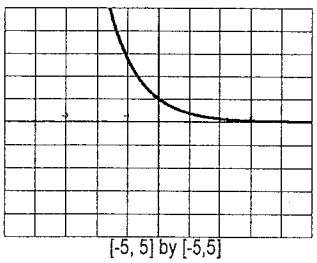


[-10,10] by [-10,10]

LEB: $\lim_{x \to -\infty} f(x) = 0$

REB: $\lim_{x \to \infty} f(x) = 4$

7.

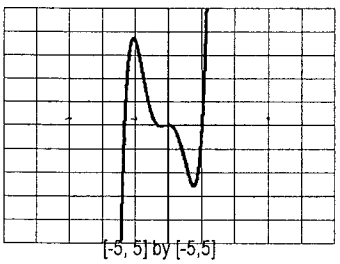


[-5, 5] by [-5,5]

LEB: $\lim_{x \to -\infty} f(x) = \infty$

REB: $\lim_{x \to \infty} f(x) = 0$

8.

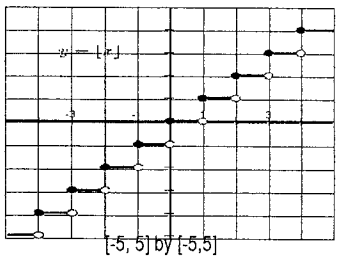


[-5, 5] by [-5,5]

LEB: $\lim_{x \to -\infty} f(x) = -\infty$

REB: $\lim_{x \to \infty} f(x) = \infty$

9.



[-5, 5] by [-5,5]

LEB: $\lim_{x \to -\infty} f(x) = -\infty$

REB: $\lim_{x \to \infty} f(x) = \infty$

Part 2: Find the vertical and horizontal asymptotes of each function.

A. $f(x)=\dfrac{x}{x-1}$ h.a. $y=1$ v.a $x=1$

B. $q(x)=\dfrac{x-1}{x}$ h.a. $y=1$ v.a. $x=0$

C. $g(x)=\dfrac{x+2}{3-x}$ h.a $y=-1$ v.a. $x=3$

D. $f(x)=\dfrac{x^2+2}{x^2-1}$ h.a. $y=1$ v.a. $x=-1$ and $x=1$

E. $p(x)=\dfrac{4}{x^2+1}$ h.a. $y=0$ no V.A.

F. $g(x)=\dfrac{4x-4}{x-1}$ h.a. $y=4$ no v.a.

G. $g(x)=\dfrac{4x-4}{x^3-8}$ h.a. $y=0$ v.a. $x=2$

H. $q(x)=1.5^x$ h.a. $y=0$ no v.a.

Part 3: Match the function with the corresponding graph by considering end behavior and asymptotes. All graphs are shown in the same viewing window of {-4.7, 4.7] by [-3.1, 3.1].

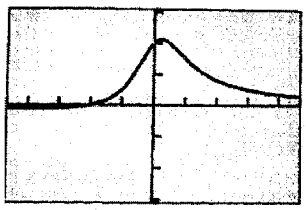
1. $y=\dfrac{x+2}{2x+1}$ B

2. $y=\dfrac{x^2+2}{2x+1}$ C

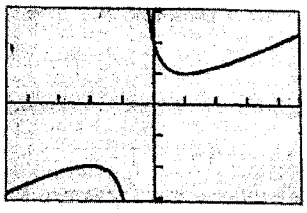
3. $y=\dfrac{x+2}{2x^2+1}$ A

4. $y=\dfrac{x^3+2}{2x^2+1}$ D

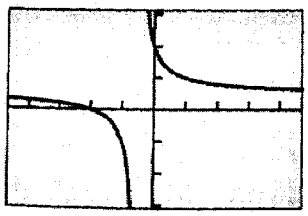
A.



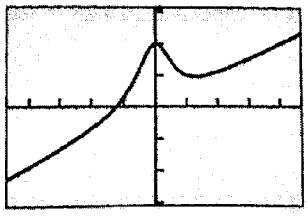
C.



B.



D.



Part 4: Graph each function and identify any discontinuities. State whether the discontinuity is removable or nonremovable.

A. $g(x)=\dfrac{3}{x}$

infinite discont. at $x=0$

non-remov.

B. $h(x)=\dfrac{x^3+x}{x}$

hole at $x=0$

remov.

C. $g(x)=\dfrac{x}{x-2}$

infinite discont. at $x=2$

non-remov.