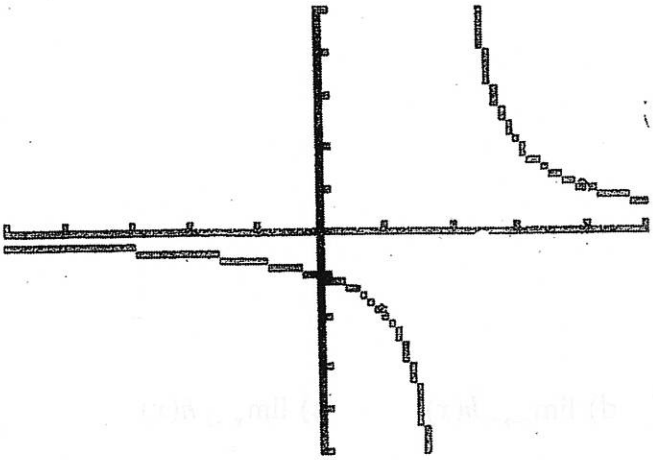
4th Quarter Project Part 1

For #1-3, write the function whose graph resembles the given graph. Show your work. Multiply out your answers.

1.

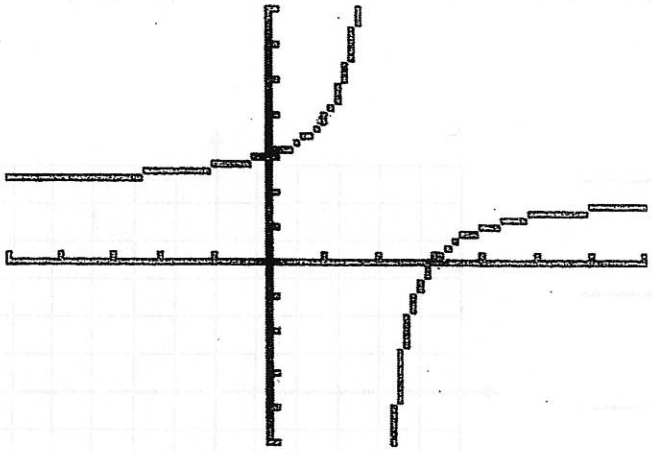


$f(x) =$ _____

Find the limits.

a) $\lim_{x\to 0^-} f(x)$ b) $\lim_{x\to 0^+} f(x)$ c) $\lim_{x\to 0} f(x)$ d) $\lim_{x\to \infty} f(x)$ e) $\lim_{x\to 2} f(x)$

2.

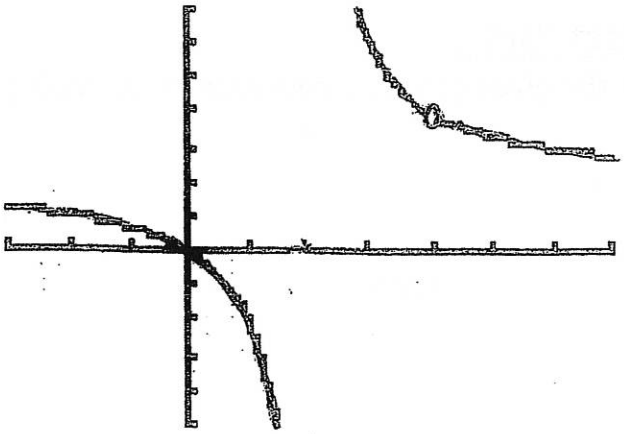


$g(x) =$ _____

Find the limits.

a) $\lim_{x\to \infty} g(x)$ b) $\lim_{x\to 2^-} g(x)$ c) $\lim_{x\to 2^+} g(x)$ d) $\lim_{x\to 2} g(x)$ e) $\lim_{x\to -1} g(x)$

3.



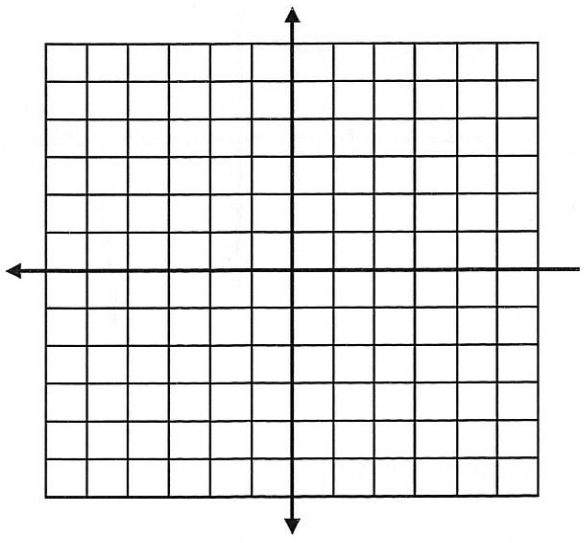
$h(x) =$ _____

Find the limits.

a) $\lim_{x\to 4^-} h(x)$ b) $\lim_{x\to 4^+} h(x)$ c) $\lim_{x\to 4} h(x)$ d) $\lim_{x\to \infty} h(x)$ e) $\lim_{x\to 2} h(x)$

4. True or False?

If the graph of a rational function has a vertical asymptote at x = 4, it is possible to sketch the graph without lifting your pencil from the paper. Explain your answer. Give an example graph and equation.



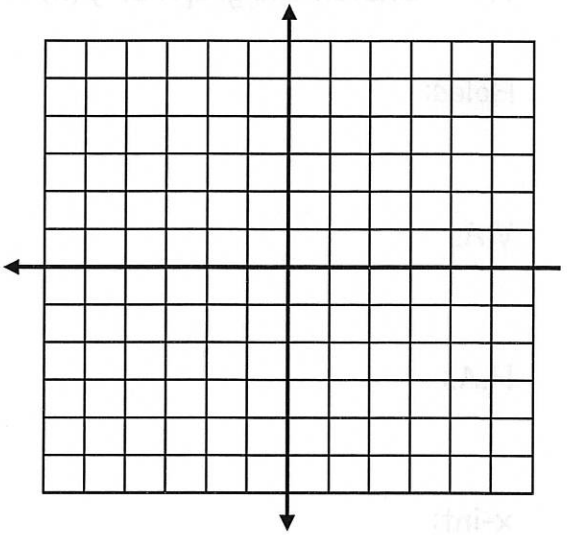
5. Write a rational equation satisfying the following conditions. Show your work.

Graph your equation.

Vertical Asymptote at x = -1

Horizontal Asymptote at y = 2

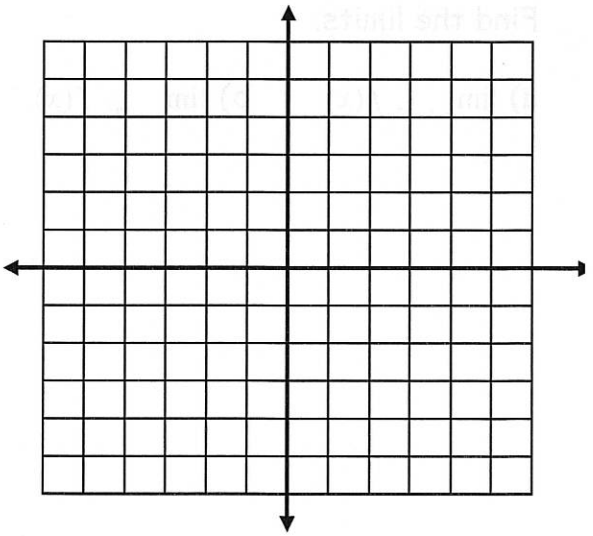
Root of the function at x = 3



Find the limits.

a) $\lim_{x\to\infty} f(x)$ b) $\lim_{x\to -1^-} f(x)$ c) $\lim_{x\to -1^+} f(x)$ d) $\lim_{x\to -1} f(x)$ e) $\lim_{x\to 3} f(x)$

6. Write a convincing statement discussing whether every rational function with a denominator that has a polynomial function of at least degree one has a vertical asymptote. Give at least one example to support your statement and graph.



7. Sketch the graph of $f(x)=\dfrac{(x-2)(x^2+5x+6)}{x+3}$. Show your work.

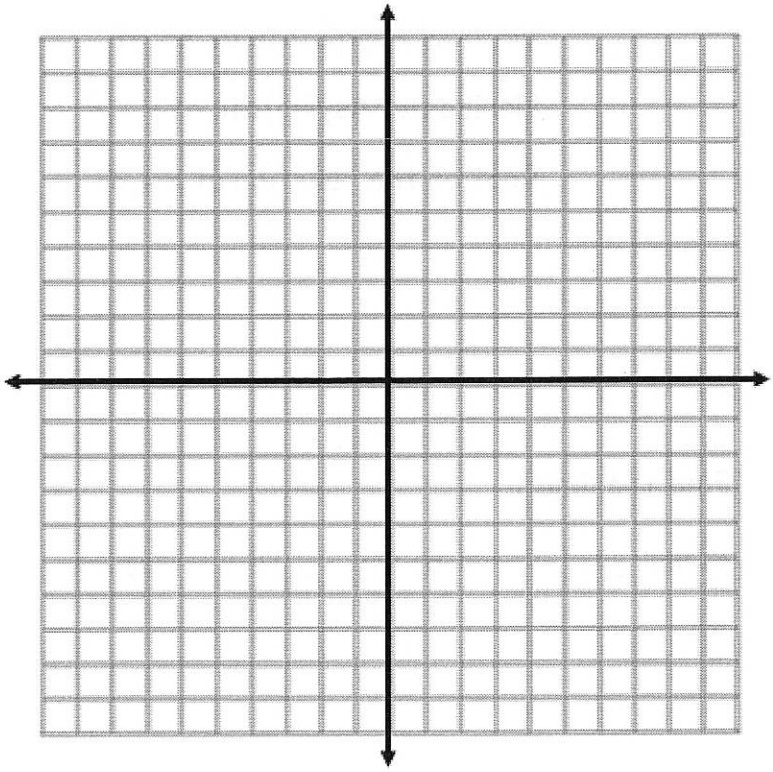
Holes:

V.A.:

H.A.:

x-int:

y-int:



Find the limits.

a) $\lim_{x\to -3^-} f(x)$ b) $\lim_{x\to -3^+} f(x)$ c) $\lim_{x\to -3} f(x)$ d) $\lim_{x\to 0} f(x)$ e) $\lim_{x\to \infty} f(x)$

4th Quarter Project Part 2

Graph each piecewise function on separate pieces of graph paper. Mount them on scrapbook/construction paper and use some color or design on your graphs. Neatness matters; use a ruler and erase any unnecessary marks.

8. Graph the piecewise function.

$$f(x)=\begin{cases} -1 & if \quad (-\infty,-2) \\ x^2-1 & if \quad [-2,1) \\ x-1 & if \quad [1,\infty) \end{cases}$$

Find the limits.

a) $\lim_{x\to -2^-} f(x)$ b) $\lim_{x\to -2^+} f(x)$ c) $\lim_{x\to 1} f(x)$ d) $\lim_{x\to 4} f(x)$ e) $\lim_{x\to 0} f(x)$

9. Graph the piecewise function.

$$g(x)=\begin{cases} |x+2| & if \quad [-3,0) \\ -2 & if \quad x=0 \\ -x+1 & if \quad (0,6] \end{cases}$$

Find the limits.

a) $\lim_{x\to 0^-} g(x)$ b) $\lim_{x\to 0^+} g(x)$ c) $\lim_{x\to 0} g(x)$ d) $\lim_{x\to -2} g(x)$ e) $\lim_{x\to 5} g(x)$

4th Quarter Project Grading

Correctness

For rational functions #1 - 3, 5, 7 _____ / 50

For each graph

5 points for correct equations

5 points for correct limits

For piecewise functions #8 & 9 _____ / 20

For each graph

5 points for correct graph

5 points for correct limits

Originality

Correct and accurate examples/graphs

for answers to questions #4 and #6 _____ / 10

Neatness

Use ruler for asymptotes

Can't see eraser marks

Use graph paper _____ / 10

Presentation

For piecewise functions #8 & 9

Use scrapbook/construction paper
Design/Color _____ / 10

TOTAL _____ / 100