Pre-Calculus CP 1 I.C.E **Name:** _____

Limits – Visual, Algebraic, to Infinity (…and beyond!!)

1)Find the following limits given the graph of $h(x)$

a) $\lim_{x\to 12^-} h(x) =$

b) $\lim_{x\to 12^+} h(x) =$

c) $\lim_{x\to 12} h(x) =$

d) $\lim_{x\to 10^-} h(x) =$

e) $\lim_{x\to 10^+} h(x) =$

f) $\lim_{x\to 10} h(x) =$

g) $\lim_{x\to 2^-} h(x) =$

h) $\lim_{x\to 2^+} h(x) =$

i) $\lim_{x\to 2} h(x) =$

j) $\lim_{x\to -4^-} h(x) =$

k) $\lim_{x\to -4^+} h(x) =$

l) $\lim_{x\to -4} h(x) =$

m) $\lim_{x\to -2^-} h(x) =$

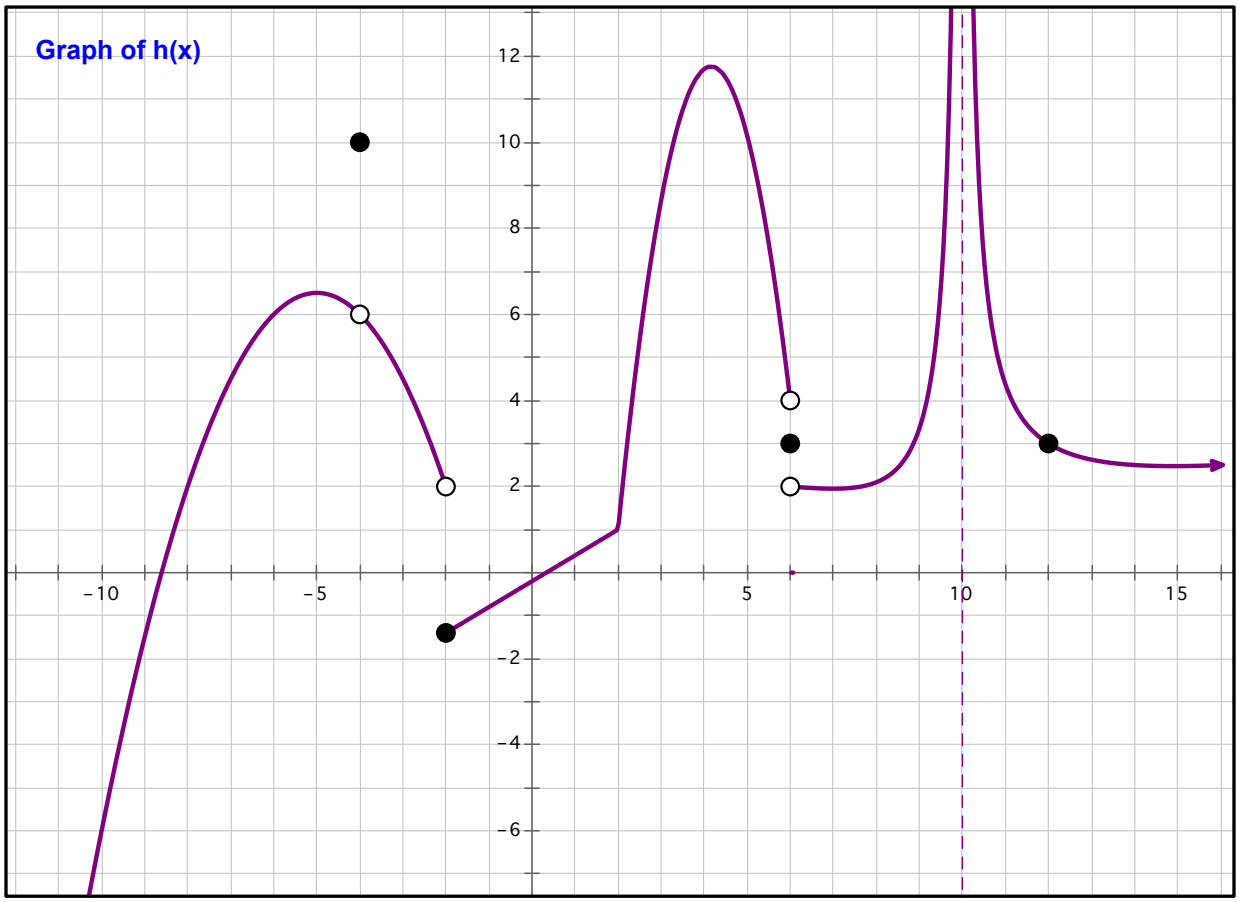
n) $\lim_{x\to -2^+} h(x) =$

o) $\lim_{x\to -2} h(x) =$

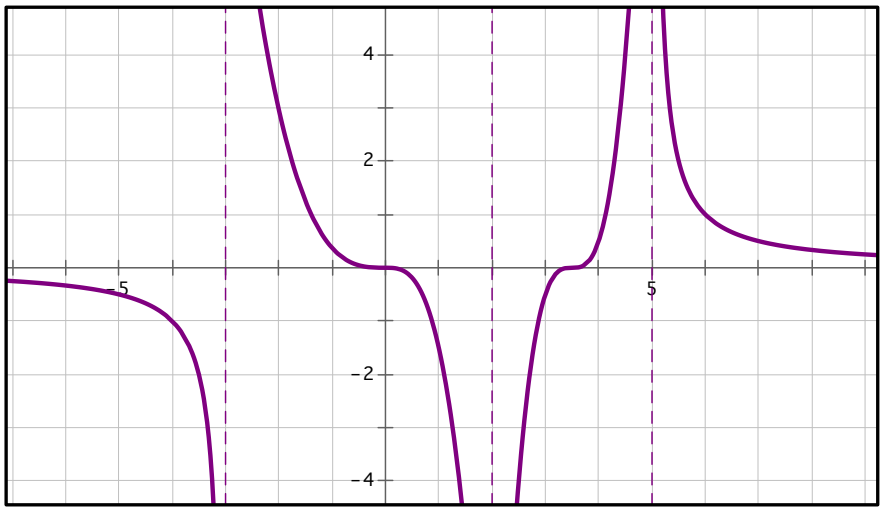
p) $\lim_{x\to 6^-} h(x) =$

q) $\lim_{x\to 6^+} h(x) =$

r) $\lim_{x\to 6} h(x) =$



2) Find the limits below based on the graph:



a) $\lim_{x\to 2} R(x) =$

b) $\lim_{x\to 5} R(x) =$

c) $\lim_{x\to \infty} R(x) =$

d) $\lim_{x\to -3^-} R(x) =$

e) $\lim_{x\to -3^+} R(x) =$

f) The equations for the vertical asymptotes are: _____, _____ and _____

3) Find the following infinite limits:

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

$$\lim_{x\to\infty} \frac{5x^6 - x^5}{x^3+1} =$$

$$\lim_{x\to\infty} \frac{3x^2}{2x+1} =$$

$$\lim_{x\to\infty}\frac{4x^2+1}{-3x^2+5}=$$

4) Find the following limits algebraically. Watch out for holes and vertical asymptotes, as answering those will require more work. Be sure to show your analysis and be careful with notation!

a) $\lim_{x\to-2}\frac{(x-4)^2}{x+2}=$

b) $\lim_{x\to-4}\frac{\sqrt{x+20}-4}{x+4}=$

c) $\lim_{x\to4}\frac{4+x}{x^2-16}=$

d) $\lim_{x\to 3}\dfrac{\dfrac{1}{x+3}-\dfrac{1}{6}}{x-3}=$

e) $\lim_{x\to 7}\dfrac{x^2+5x-14}{49-x^2}=$

f) $\lim_{x\to 7}\left(-5\right)=$

g) $\lim_{x\to \pi/2}\left(2\sin x+2\right)=$

h) $\lim_{x\to 3^-}\dfrac{-4x^2-2}{x-3}=$

i) $\lim_{x\to 5}\dfrac{-x+1}{(x-5)^3}=$

j) $\lim_{x\to 4}\dfrac{x^2-3}{x+4}=$

5)

a) Use a number line to solve the inequality: $\dfrac{-3(x-4)(x-1)(x+6)}{(x-4)(x+2)^2} \le 0$

b) Sketch the graph of $f(x) = \dfrac{-3(x-4)(x-1)(x+6)}{(x-4)(x+2)^2}$

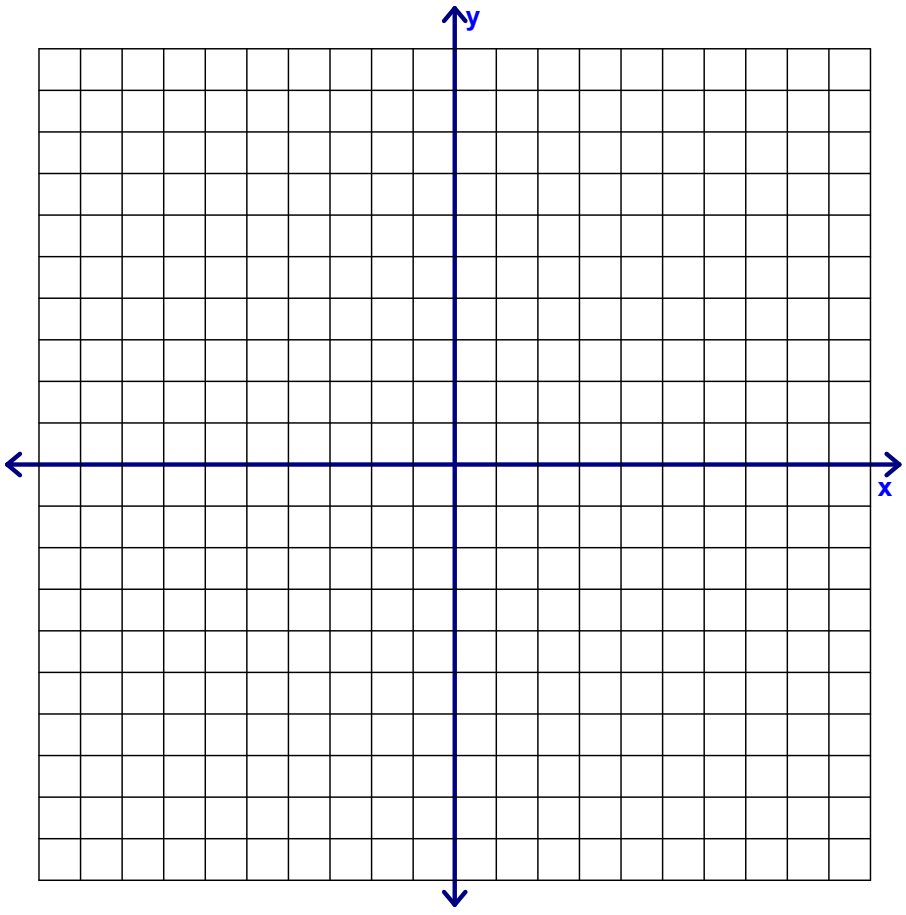
Hole? _____ If yes, where? _____

HA / SA? _____

VA? _____

x-int? _____

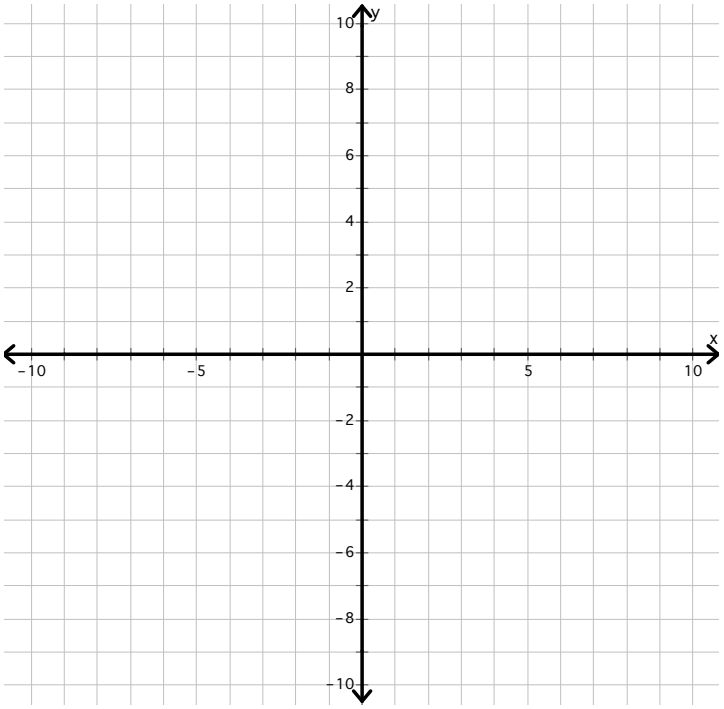
y-int? _____



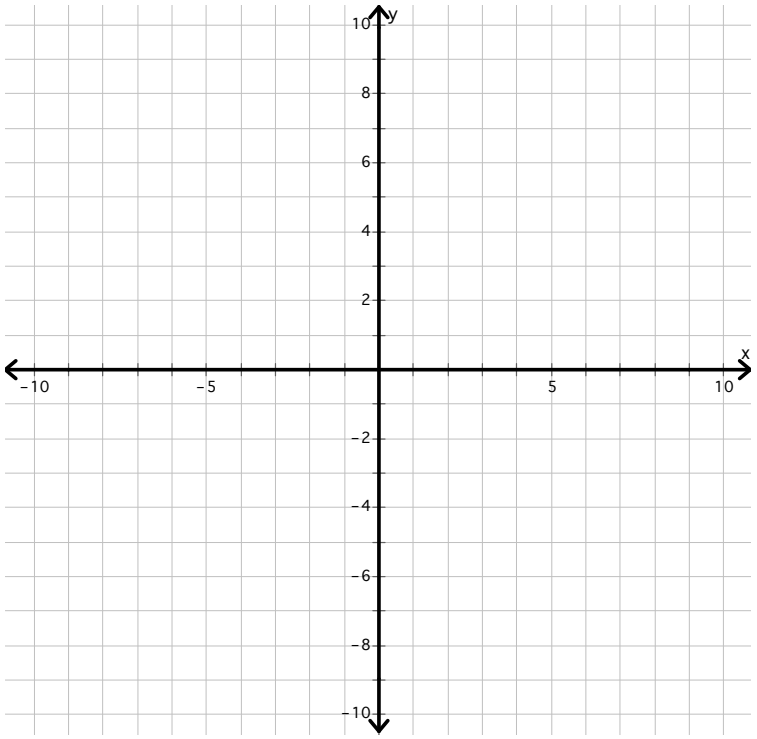
6) Sketch possible graphs of the following given that you do not wish to cross a horizontal asymptote unless absolutely necessary:

a) $\lim_{x\to\infty} f(x) = 7$ $\lim_{x\to-\infty} f(x) = 7$

$\lim_{x\to 2^-} f(x) = \infty$ $\lim_{x\to 2^+} f(x) = -\infty$



b) $f(-1)$ exists, $\lim_{x\to-1^+} f(x)$ exists and equals $f(-1)$, AND $\lim_{x\to-1} f(x)$ does exist.



c) $f(x) = 0$ at $x = 3$

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

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

$\lim_{x\to-3^+} f(x) = \infty$

$\lim_{x\to-3} f(x) = \text{DNE}$

Crosses $y - axis$ at $(0,2)$

$f(x)$ is undefined at $x = -3$ and $x = 5$