$$\lim_{x\to -1} \frac{(x+3)^3-8}{x+1}$$

$a=(x+3)$
$b=2$

$(a-b)(a^2+ab+b^2)$

$$\lim_{x\to -1} \frac{\cancel{(x+3-2)}\left((x+3)^2+2(x+3)+4\right)}{\cancel{x+1}}$$

$(-1+3)^2+2(-1+3)+4$

$4+4+4$

$\boxed{12}$

Aug 21-7:52 AM

4. Consider the following piece-wise defined function: $f(x)=\begin{cases} -3+2x-x^2 & \text{if } x<-1 \\ -3+2x-x^2 & \text{if } x\geqslant -1 \end{cases}$

Find the following limits:

a) $\lim_{x\to -1^-} f(x)$ -6 b) $\lim_{x\to -1^+} f(x)$ -6 c) $\lim_{x\to -1} f(x)$ -6 d) $\lim_{x\to -2} f(x)$ -11 e) $\lim_{x\to 0} f(x)$ -3

Find $\lim_{x\to 9} \frac{\cancel{x-9}}{\sqrt{x}-3}\cdot\frac{(\sqrt{x}+3)}{(\sqrt{x}+3)} =$ $\cancel{(x-9)}$ $\boxed{6}$

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

$(x^2-1)(4x^2-1)$

$(x+1)\cancel{(x-1)}(2x+1)(2x-1)$

$(x+3)\cancel{(x-1)}$

$$\lim_{x\to -2} \frac{\frac{x}{x+4}+1\cdot\frac{x+4}{x+4}}{x+2} =$$

$2\cancel{(x+2)}$

$\frac{\frac{2x+4}{x+4}}{\frac{x+2}{1}}\cdot\frac{1}{\cancel{x+2}}=\frac{2}{x+4}$ $=$ $\boxed{1}$

$$\lim_{x\to 2} \frac{\frac{2}{2}\cdot\frac{2}{x^2}-\frac{1}{2}\cdot\frac{x^2}{x^2}}{x-2} =$$

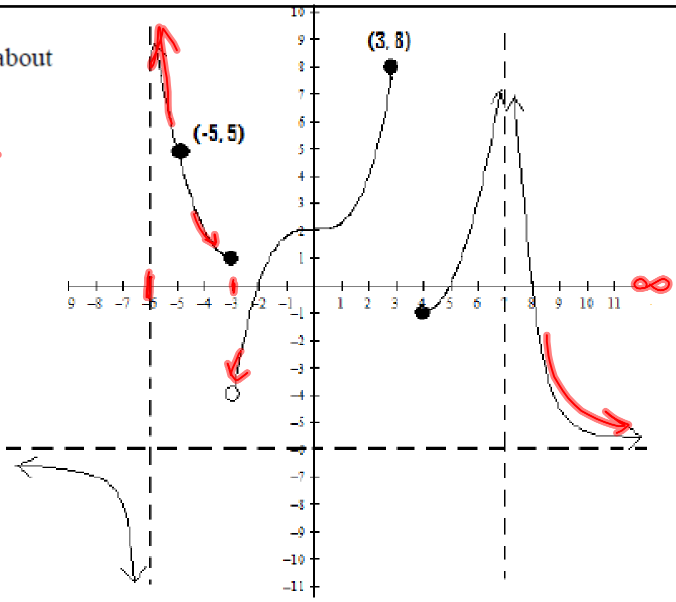
$-(x^2-4)$

$\frac{\frac{4-x^2}{2x^2}}{\frac{x-2}{1}}\cdot\frac{1}{x-2}$

$\frac{-(x+2)\cancel{(x-2)}}{2x^2}\cdot\frac{1}{\cancel{x-2}}=\boxed{\frac{-1}{2}}$

Aug 21-8:10 AM

1. Which of the following statements is/are true about the graph of $H(x)$?



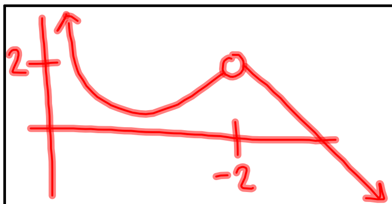
I. $\lim_{x\to -3^-} H(x) = H(-3)$ TRUE

II. $\lim_{x\to\infty} H(x) = -6$ TRUE

x → y-values

III. $\lim_{x\to -6^+} H(x) = -\infty$ FALSE

Aug 21-8:13 AM



$$G(x) = \begin{cases} 2x^2 + 3x, & x < -2 \\ -\frac{1}{2}x + 1, & x > -2 \end{cases}$$

a) $\lim_{x\to -2^-} G(x)$

2

b) $\lim_{x\to -2^+} G(x)$

2

c) $\lim_{x\to -2} G(x)$

2

G(-2) = undefined

Closed Circle

Aug 21-8:13 AM

Find $\lim_{x \to \frac{\pi}{6}} \frac{\sin x}{3x}$.

$$\frac{\sin(\frac{\pi}{6})}{3(\frac{\pi}{6})} = \frac{1/2}{\pi/2}$$

$$\frac{1}{2} \cdot \frac{2}{\pi} = \frac{\cancel{2}}{\cancel{2}\pi} = \frac{1}{\pi}$$

$$\lim_{x \to 0} \frac{\sin x}{3x}$$

$$\frac{1}{3} \underbrace{\frac{\sin x}{x}}_{1}$$

$$\boxed{\frac{1}{3}}$$

Aug 22-7:41 AM

$$\lim_{x \to 2} f(x) \text{ if } f(x) = \begin{cases} 2x^2 - 4x, & x < 2 \\ 4\sin\left(\frac{\pi x}{4}\right) & x > 2 \end{cases}$$

DNE

$f(2) \to$ undefined

Aug 22-7:43 AM

Find $\lim_{x \to 0} \frac{4x + \sin x}{2x}$

$$\frac{4x}{2x} + \frac{\sin x}{2x}$$

$$2 + \frac{1}{2}\frac{\sin x}{x}$$

$$2 + 1/2$$

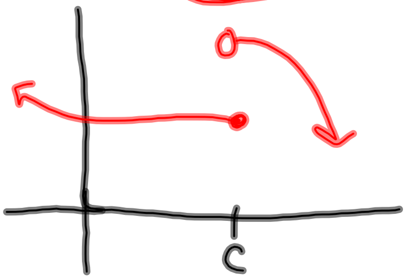
$$\boxed{2.5}$$

Aug 22-7:45 AM

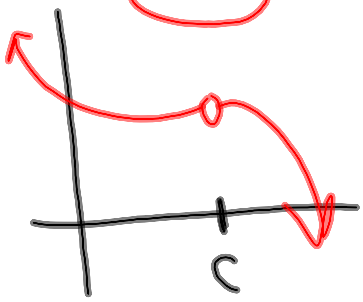
$\lim_{x \to 7} \frac{\sqrt{x+2}-3}{x-7}$.

Aug 21-8:14 AM

Draw the graph of a function that is defined at x=c but the limit as x aproaches c does not exist



Draw the graph of a function that is not defined at x=c but the limit as x approaches c does exist.



Aug 21-8:14 AM

Draw a graph that meets the following criteria.

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

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

$f(-2) = 4$

$\lim_{x \to -2} f(x) = 1$

$\lim_{x \to \infty} = 0$

Aug 22-7:51 AM

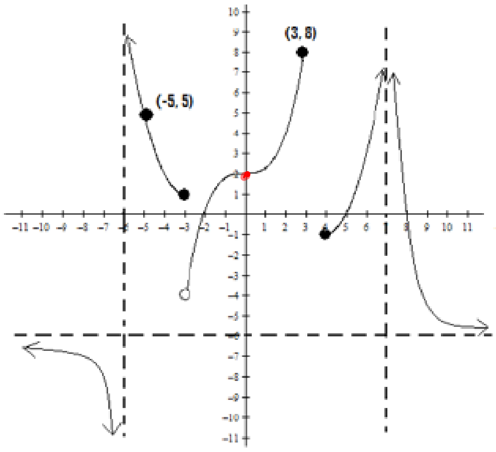
1. Which of the following statements is/are true about the graph of $H(x)$?

~~I. $\lim_{x \to -3^+} H(x) = H(-3)$~~

II. $\lim_{x \to \infty} H(x) = -6$ ✓

III. $\lim_{x \to -6^-} H(x) = -\infty$ ✓

A. I and II only
B. II only
C. I and III only
D. II and III only
E. I, II, and III



2. Which of the following limit(s) do(es) **not** exist?

I. $\lim_{x \to 7} H(x)$ DNE

II. $\lim_{x \to -3} H(x)$ DNE

III. $\lim_{x \to 0} H(x)$

A. I only
B. I and II only
C. II only
D. II and III only
E. III only

Aug 25-7:55 AM

3. If $g(x) = \begin{cases} e^x(x+1), & x < -2 \\ \cos(\pi x), & x > -2 \end{cases}$, which of the following statements is/are true?

I. $g(-2)$ is undefined. TRUE

II. $\lim_{x \to -2^-} g(x) = -\frac{1}{e^2}$ TRUE

III. $\lim_{x \to -2} g(x)$ exists. FALSE

A. I and II only B. II only C. II and III only D. I and III only E. I, II, and III

$e^{-2}(-2+1)$

$-e^{-2}$

$-\frac{1}{e^2}$

$\cos(-2\pi)$

Aug 25-7:55 AM

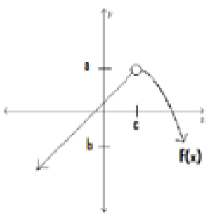
4. Find $\lim_{x \to 3} \frac{\sqrt{x+1}-2}{x-3}$. $\cdot \frac{\sqrt{x+1}+2}{\sqrt{x+1}+2} = \frac{\cancel{x+1-4}}{\cancel{(x-3)}(\sqrt{x+1}+2)} = \frac{1}{\sqrt{x+1}+2}$

A. 4 B. ½ C. ¼ D. -4 E. Limit does not exist

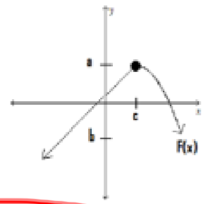
$$\frac{1}{\sqrt{3+1}+2} = \frac{1}{4}$$

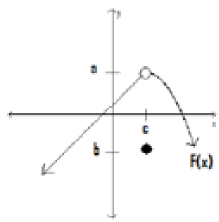
5. Which one of the following graphs shows that $F(c)$ is defined but the $\lim_{x \to c} F(x)$ does not exist?

A.

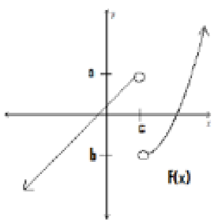


B. C.

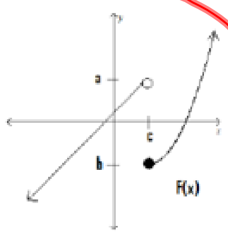




D.



E.



10. $\lim_{x\to 3} -\sqrt{x+3}$

$-\sqrt{3+3}$

$\boxed{-\sqrt{6}}$

11. $\lim_{x\to \frac{3}{2}} \frac{-x-3}{x^2+x+1}$

$$\frac{-\frac{3}{2}-3}{\left(\frac{3}{2}\right)^2+\frac{3}{2}+1} = \frac{\frac{-9}{2}}{\frac{19}{4}}$$

$\frac{9}{4}+\frac{6}{4}+\frac{4}{4}$

$\boxed{-18/19}$

Aug 25-7:57 AM

12. $\lim_{x\to 0} \frac{\frac{4}{4}\cdot\frac{1}{-4+x}+\frac{1}{4}\cdot\frac{(-4+x)}{(-4+x)}}{x}$

$$\frac{\frac{4+-4+x}{4(-4+x)}}{\frac{x}{1}} = \frac{\cancel{x}}{4(-4+x)}\cdot\frac{1}{\cancel{x}}$$

$$= \frac{1}{4(-4+x)} = \boxed{-\frac{1}{16}}$$

13. $\lim_{x\to 2} -\frac{x^2-x-2}{\cancel{x-2}}$

$\cancel{(x-2)}(x+1)$

$-(x+1)$

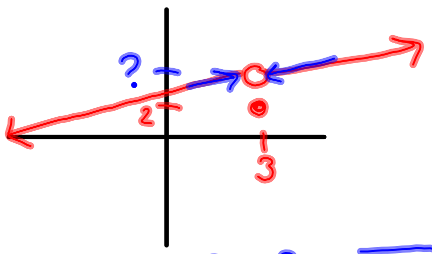
$-(2+1)$

$\boxed{-3}$

Aug 25-7:57 AM

14. $f(3) = 2$

$\lim\limits_{x \to 3} f(x),\ f(x) = \begin{cases} 2 + \frac{x}{2}, & x \neq 3 \\ 2, & x = 3 \end{cases}$



$2 + \frac{3}{2} = \boxed{3.5}$

15.

$\lim\limits_{x \to -2} f(x),\ f(x) = \begin{cases} x^2, & x \leq -2 \\ -\frac{x}{2} + 3, & x > -2 \end{cases}$

$\lim\limits_{x \to -2^-} f(x) = \lim\limits_{x \to -2^+} f(x)$

$(-2)^2 \qquad -\frac{-2}{2} + 3$

$4 \overset{\checkmark}{=} 4$

$\boxed{4}$

Aug 25-7:57 AM

16. $\lim\limits_{x \to 3^-} -\frac{4x}{x-3}$

$\frac{-4(2.9)}{2.9 - 3} = \frac{\text{Neg}}{\text{Neg}} = +$

∞

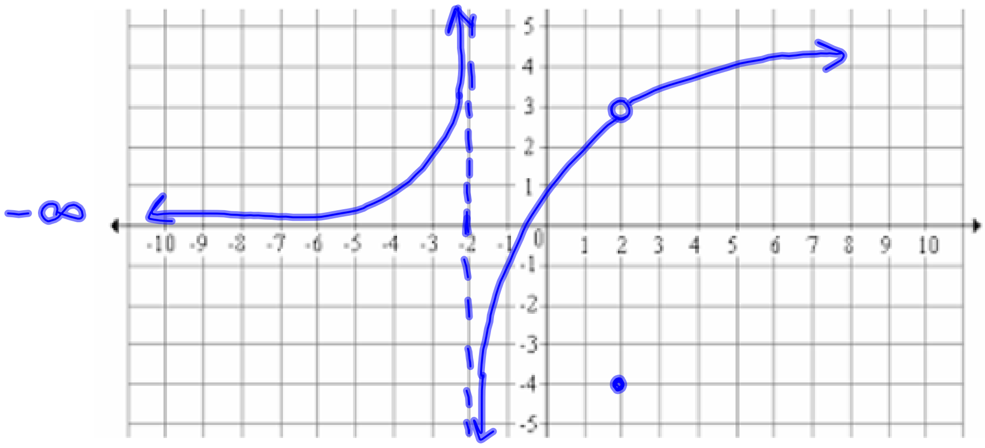
17. $\lim\limits_{x \to 3} \frac{\sqrt{x+6} - 3}{x - 3}$

Aug 25-7:57 AM

6. Draw a graph of a function, $H(x)$, that meets the following criteria.

$\lim_{x\to -2^-} H(x) = \infty$ $\lim_{x\to -2^+} H(x) = -\infty$ $\boxed{\lim_{x\to 2} H(x) = 3}$

$\lim_{x\to -\infty} H(x) = 0$ $H(2) = -4$



Aug 25-8:39 AM

Given $\lim_{x\to 3} F(x) = 4$ and $\lim_{x\to 3} G(x) = -2$, find the following limits:

$3(4) + 2(-2)$

7. $\lim_{x\to 3} 3F(x) + 2G(x)$

8

8. $\lim_{x\to 3} G(x) + \sqrt{F(x)}$

0

Aug 25-8:44 AM

9. Consider the functions below to answer the following questions.

$$F(x)=\begin{cases} x^2+2|x|, & x<-2 \\ 3x+a, & x>-2 \end{cases} \qquad G(x)=\frac{2x^2-5x-3}{x^2-9}$$

a. Find the value of $\lim_{x\to -2^-} F(x)$. Show your work.

$(-2)^2+2|-2| = \boxed{8}$

b. Is $G(3)=\lim_{x\to 3} G(x)$? Show your work and explain your reasoning.

undef.

#

c. In order for $\lim_{x\to -2} F(x)$ to exist, what two limits must be equal? Find the value(s) of a for which this limit exists. Show your work.

$3(-2)+a=8$

$-6+a=8$

$a=14$

Aug 25-8:46 AM

20. Give an example of a two-sided limit of a piece-wise function where the limit does not exist.

21. Give an example of a limit that evaluates to 7.

Aug 25-7:57 AM

Extra Credit: (5 points, MUST SHOW WORK!) $\lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$ if $f(x) = 3x^2 + 4x - 5$

Aug 25-7:58 AM

Aug 25-8:44 AM