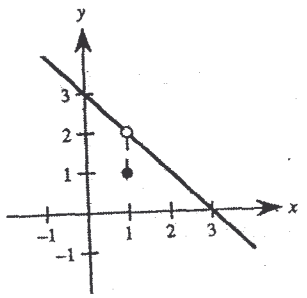
Name Key

Calculus Test #1 Review

1. Use the graph to find $\lim_{x\to 1} f(x)$ if

$$f(x)=\begin{cases}3-x, & x\neq 1\\ 1, & x=1\end{cases}.$$

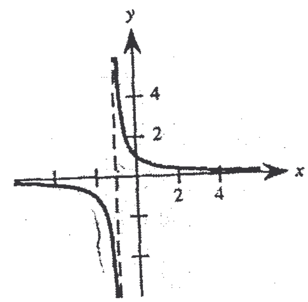


A) 2   B) 1   C) $\frac{3}{2}$

D) Does not exist   E) None of these

2. Use the graph to find $\lim_{x\to -1} f(x)$ if

$$f(x)=\frac{1}{x+1}.$$

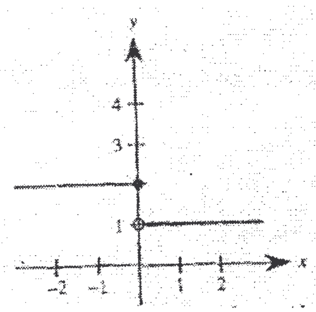


A) 0   B) 1   C) ∞

D) DNE   E) None of these

3. Use the graph to find the $\lim_{x\to 0} f(x)$ (if it exists).

DNE

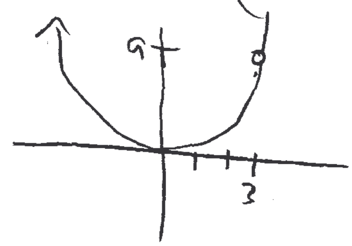


4. Determine whether the statement is true or false. If it is false, give an example to show that it is false.

If $\lim_{x\to 3} f(x)=9$, then $f(3)=9$

False

$f(x)=\begin{cases} x^2, & x\neq 3\end{cases}$



11. If $\lim_{x\to c} f(x) = -6$ and $\lim_{x\to c} g(x) = 3$, then find $\lim_{x\to c}([f(x)]^2 - 2f(x)g(x) + [g(x)]^2)$

$(-6)^2 - 2(-6)(3) + (3)^2$

$36 + 36 + 9$

81

A) 63 B) 81 C) 45
D) -9 E) None of these

12. If $\lim_{x\to c} f(x) = -\frac{1}{2}$ and $\lim_{x\to c} g(x) = \frac{2}{3}$, find $\lim_{x\to c}\frac{f(x)}{g(x)}$.

$= \frac{\lim_{x\to c} f(x)}{\lim_{x\to c} g(x)} = \frac{-\frac{1}{2}}{2/3}$

$-\frac{1}{2} \cdot \frac{3}{2} = \boxed{-3/4}$

13. Find $\lim_{x\to\frac{\pi}{2}} \frac{\sin x}{x}$.

$\frac{\sin \pi/2}{\pi/2} = \frac{1}{\pi/2}$

A) 0 B) $\frac{2}{\pi}$ C) $-\frac{\pi}{2}$
D) $\frac{2\sqrt{2}}{\pi}$ E) None of these

14. Find a function that agrees with *f(x)* at all but one point by factoring/cancelling.

$$f(x) = \frac{x^2 - 5x - 6}{x+1}$$

Then find $\lim_{x\to -1} \frac{x^2 - 5x - 6}{x+1}$

$f(x) = \frac{x^2 - 5x - 6}{x+1} = \frac{(x-6)\cancel{(x+1)}}{\cancel{x+1}}$

$= x - 6$

$\lim_{x\to -1} f(x) = -1 - 6 = -7$

15. Find $\lim_{x\to -2} \frac{x+2}{x^3+8}$.

SOAP

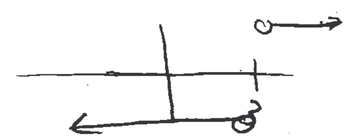
$= \lim_{x\to -2} \frac{x+2}{(x+2)(x^2-2x+4)}$

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

$= \frac{1}{4+4+4} = \boxed{\frac{1}{12}}$

16. Find $\lim_{x\to 3} \frac{x-3}{|x-3|}$.

DNE

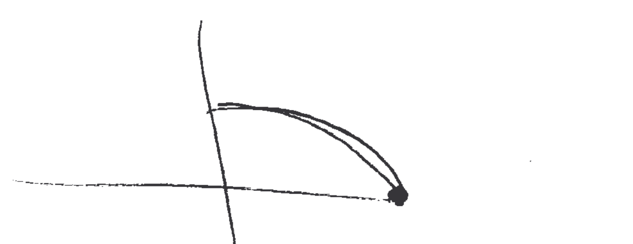


17. Find the limit: $\lim_{x\to 1} \frac{3x^3 - 4x^2 - 5x + 2}{x^2 - x - 2}$.

$3 - 4 - 5 + 2$

$1 - 1 - 2$

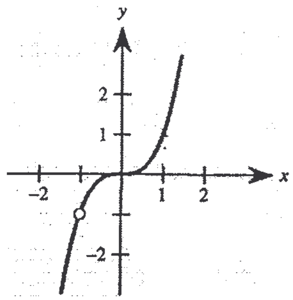
$= \frac{-4}{-2} = \boxed{2}$



$1 \div \pi/2$

5a. Use the graph to find $\lim_{x \to 1} f(x)$ (if it exists). A

5b. Use the graph to find $\lim_{x \to -1} f(x)$ (if it exists). D



Use for ~~7a~~ 5a and ~~7b~~ 5b:

A) 1 B) -2 C) DNE

D) -1 E) -3

6. Find $\lim_{x \to -3} (-2x^2 + 1)$.

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

$-2(9) + 1$

$-18 + 1$

-17

A) 37 B) 19 C) -17

D) $\pm\sqrt{2}$ E) None of these

7. Find $\lim_{x \to -1} \frac{x^2 + 3x + 2}{x^2 + 1}$. $= \frac{(-1)^2 + 3(-1) + 2}{(-1)^2 + 1}$

$= \frac{1 - 3 + 2}{2} = \frac{0}{2} = \boxed{0}$

8. Find $\lim_{x \to 1} \frac{x^2 - x - 2}{x - 3}$ $= \frac{1 - 1 - 2}{1 - 3} = \frac{-2}{-2}$ 1

9. Find $\lim_{x \to 3} \sqrt{9 - x^2}$ $= \sqrt{9 - (3)^2} = \cancel{0}$

$\lim_{x \to 3^-} = 0$

$\lim_{x \to 3^+}$ DNE

DNE

left/right don't agree

A) 0 B) $\sqrt{6}$ C) $3\sqrt{2}$

D) DNE E) None of these

10. Find $\lim_{x \to 2} \sqrt{4x^2 + 9}$ $= \sqrt{4(2)^2 + 9}$

$\sqrt{4(4) + 9}$

$\sqrt{16 + 9} = \sqrt{25} = \boxed{5}$

18. Find the limit: $\lim_{\Delta x\to 0}\frac{\sqrt{(x+\Delta x)+8}-\sqrt{x+8}}{\Delta x}$ $\left(\frac{\sqrt{x+\Delta x+8}+\sqrt{x+8}}{\sqrt{x+\Delta x+8}+\sqrt{x+8}}\right)$

$$= \lim_{\Delta x\to 0}\frac{x+\Delta x+8-(x+8)}{\Delta x\left(\sqrt{x+\Delta x+8}+\sqrt{x+8}\right)}$$

$$= \lim_{\Delta x\to 0}\frac{\Delta x}{\Delta x\left(\sqrt{x+\Delta x+8}+\sqrt{x+8}\right)} = \lim_{\Delta x\to 0}\frac{1}{\sqrt{x+\Delta x+8}+\sqrt{x+8}}$$

$$= \frac{1}{\sqrt{x+0+8}+\sqrt{x+8}} = \frac{1}{\sqrt{x+8}+\sqrt{x+8}} = \boxed{\frac{1}{2\sqrt{x+8}}}$$

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19. Find $\lim_{x\to 0}\frac{\sqrt{x+4}-2}{x}$ $\left(\frac{\sqrt{x+4}+2}{\sqrt{x+4}+2}\right)$

$$= \lim_{x\to 0}\frac{x+4-4}{x\left(\sqrt{x+4}+2\right)} = \lim_{x\to 0}\frac{x}{x\left(\sqrt{x+4}+2\right)} = \lim_{x\to 0}\frac{1}{\sqrt{x+4}+2}$$

$$= \frac{1}{\sqrt{0+4}+2} = \frac{1}{\sqrt{4}+2} = \frac{1}{2+2} = \boxed{\frac{1}{4}}$$

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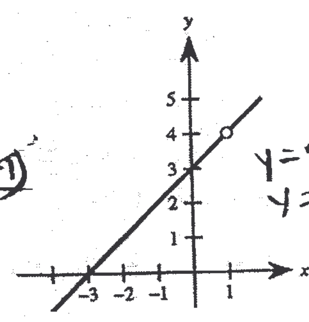
20. Match the graph with the correct function.

A) $f(x)=\frac{x+3}{x-1}$ B) $f(x)=x+3$

C) $f(x)=\frac{x-1}{x^2+2x-3}$ D) $f(x)=\frac{x^2+2x-3}{x-1}$ $\frac{(x+3)\cancel{(x-1)}}{\cancel{(x-1)}}$

E) None of these



$y=mx+b$

$y=x+3$