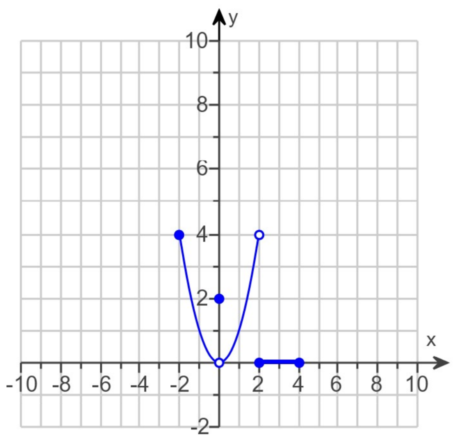
Student: Cole Lamers **Date:** 09/01/19	**Instructor:** Viktoriya Shcherban **Course:** Calc 1 11:30 AM / Internet (81749&81750) Shcherban	**Assignment:** 2.4 One Sided Limits

1. Use the graph below to determine whether the statements about the function $y = f(x)$ are true or false.



True or false: $\lim_{x \to -2^+} f(x) = 4$.

- False
- True ✔

True or false: $\lim_{x \to 0^-} f(x) = 2$.

- False ✔
- True

True or false: $\lim_{x \to 0^-} f(x) = \lim_{x \to 0^+} f(x)$.

- False
- True ✔

True or false: $\lim_{x \to 0} f(x)$ exists.

- True ✔
- False

True or false: $\lim_{x \to 0} f(x) = 0$.

- True ✔
- False

True or false: $\lim_{x \to 2} f(x) = 4$.

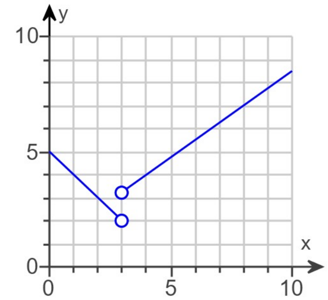
- False ✔
- True

True or false: $\lim_{x \to 4^-} f(x) = 4$.

- True
- False ✔

2. Use the following function and its graph to answer (a) through (d) below.

Let $f(x) = \begin{cases} 5 - x, & x < 3 \\ \dfrac{3x}{4} + 1, & x > 3. \end{cases}$



a. Find $\lim_{x \to 3^+} f(x)$ and $\lim_{x \to 3^-} f(x)$. Select the correct choice below and fill in any answer boxes in your choice.

A. $\lim_{x \to 3^+} f(x) = \dfrac{13}{4}$, $\lim_{x \to 3^-} f(x) = 2$ (Simplify your answer.)

B. The limit does not exist.

b. Does $\lim_{x \to 3} f(x)$ exist? If so, what is it? If not, why not?

A. No, $\lim_{x \to 3} f(x)$ does not exist because $\lim_{x \to 3^+} f(x) \neq \lim_{x \to 3^-} f(x)$.

B. Yes, $\lim_{x \to 3} f(x)$ exists and equals 2.

C. Yes, $\lim_{x \to 3} f(x)$ exists and equals 3.25.

D. No, $\lim_{x \to 3} f(x)$ does not exist because f(3) is undefined.

c. Find $\lim_{x \to 5^+} f(x)$ and $\lim_{x \to 5^-} f(x)$. Select the correct choice below and fill in any answer boxes in your choice.

A. $\lim_{x \to 5^+} f(x) = \dfrac{19}{4}$, $\lim_{x \to 5^-} f(x) = \dfrac{19}{4}$ (Simplify your answer.)

B. The limit does not exist.

d. Does $\lim_{x \to 5} f(x)$ exist? If so, what is it? If not, why not?

A. Yes, $\lim_{x \to 5} f(x)$ exists and equals 4.75.

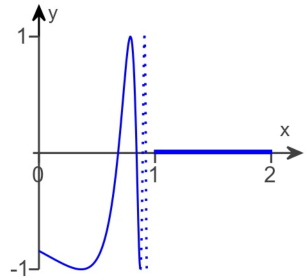
B. No, $\lim_{x \to 5} f(x)$ does not exist because f(5) is undefined.

C. No, $\lim_{x \to 5} f(x)$ does not exist because $\lim_{x \to 5^+} f(x) \neq \lim_{x \to 5^-} f(x)$.

D. Yes, $\lim_{x \to 5} f(x)$ exists and equals 0.

3. Consider the function given below.

$$f(x) = \begin{cases} \sin \dfrac{1}{x-1}, & x < 1 \\ 0, & x \geq 1 \end{cases}$$



Complete parts **(a)** through **(c)**.

(a) Does $\lim_{x \to 1^-} f(x)$ exist? If so, what is it? If not, why not?

- **A.** Yes, $\lim_{x \to 1^-} f(x) =$ ______. (Simplify your answer.)
- **B.** No, because there is no real number to which the function's values stay increasingly close as x approaches 1 from the left side.

(b) Does $\lim_{x \to 1^+} f(x)$ exist? If so, what is it? If not, why not?

- **A.** Yes, $\lim_{x \to 1^+} f(x) =$ 0 . (Simplify your answer.)
- **B.** No, because there is no real number to which the function's values stay increasingly close as x approaches 1 from the right side.

(c) Does $\lim_{x \to 1} f(x)$ exist? If so, what is it? If not, why not?

- **A.** Yes, $\lim_{x \to 1} f(x) =$ ______. (Simplify your answer.)
- **B.** No, because the left-hand and right-hand limits are not equal.

4.

a. Graph $f(x) = \begin{cases} x^2, & x \neq -3 \\ -5, & x = -3. \end{cases}$

b. Find $\lim_{x \to -3^-} f(x)$ and $\lim_{x \to -3^+} f(x)$.

c. Does $\lim_{x \to -3} f(x)$ exist? If so, what is it? If not, why not?

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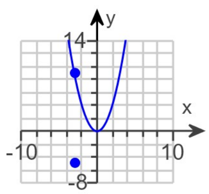
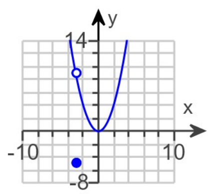
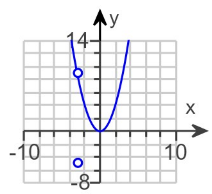
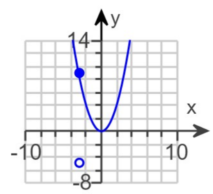
a. Choose the correct graph below.

A. 

B. 

C. 

D. 

b. Find $\lim_{x \to -3^-} f(x)$ and $\lim_{x \to -3^+} f(x)$. Select the correct choice below and fill in any answer boxes in your choice.

A. $\lim_{x \to -3^-} f(x) =$ 9 , $\lim_{x \to -3^+} f(x) =$ 9 (Simplify your answer.)

B. The limit does not exist.

c. Does $\lim_{x \to -3} f(x)$ exist? Choose the correct answer below.

A. No, $\lim_{x \to -3} f(x)$ does not exist because $f(-3)$ is not on the curve x^2.

B. No, $\lim_{x \to -3} f(x)$ does not exist because $\lim_{x \to -3^-} f(x) \neq \lim_{x \to -3^+} f(x)$.

C. Yes, $\lim_{x \to -3} f(x)$ exists and equals -5.

D. Yes, $\lim_{x \to -3} f(x)$ exists and equals 9.

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5. Find the following limit.

$$\lim_{x \to -0.2^+} \sqrt{\frac{x+5}{x+1}}$$

$$\lim_{x \to -0.2^+} \sqrt{\frac{x+5}{x+1}} = \sqrt{6}$$

6. Find $\lim_{x \to c^+} f(x)$ for the given function and value of c.

$$f(x) = \left(\frac{8x}{x+1}\right)\left(\frac{2x+8}{x^2+x}\right), \; c = 8$$

$$\lim_{x \to 8^+} \left(\frac{8x}{x+1}\right)\left(\frac{2x+8}{x^2+x}\right) = \frac{64}{27}$$

(Type a simplified fraction.)

7. Find the limit.

$$\lim_{h \to 0^+} \frac{\sqrt{h^2+4h+11} - \sqrt{11}}{h}$$

Select the correct choice below and fill in any answer boxes in your choice.

A. $\lim_{h \to 0^+} \frac{\sqrt{h^2+4h+11} - \sqrt{11}}{h} = \frac{2}{\sqrt{11}}$

B. The limit does not exist.

8. Use the relation $\lim_{\theta \to 0} \frac{\sin \theta}{\theta} = 1$ to determine the limit of the given function.

$$f(\theta) = \frac{7 \sin \sqrt{2}\theta}{\sqrt{2}\theta}$$

$$\lim_{\theta \to 0} \frac{7 \sin \sqrt{2}\theta}{\sqrt{2}\theta} = 7$$

(Type an integer or a simplified fraction.)

9. Find the limit.

$$\lim_{x \to 0} \frac{x \csc 11x}{\cos 8x}$$

Select the correct choice below and fill in any answer boxes in your choice.

A. $\lim_{x \to 0} \frac{x \csc 11x}{\cos 8x} = \frac{1}{11}$ (Simplify your answer.)

B. The limit does not exist.

10. Use the relation $\lim\limits_{\theta \to 0} \dfrac{\sin \theta}{\theta} = 1$ to determine the limit shown below.

$$\lim_{\theta \to 0} \frac{1 - \cos \theta}{\sin 22\theta}$$

$\lim\limits_{\theta \to 0} \dfrac{1 - \cos \theta}{\sin 22\theta} =$ 0

(Simplify your answer.)

11. Find the following limit.

$$\lim_{\theta \to -\frac{\pi}{2}} \theta \sin \theta$$

Select the correct choice below and fill in any answer boxes within your choice.

A. $\lim\limits_{\theta \to -\frac{\pi}{2}} \theta \sin \theta = \dfrac{\pi}{2}$ (Type an exact answer, using π as needed.)

B. The limit does not exist.