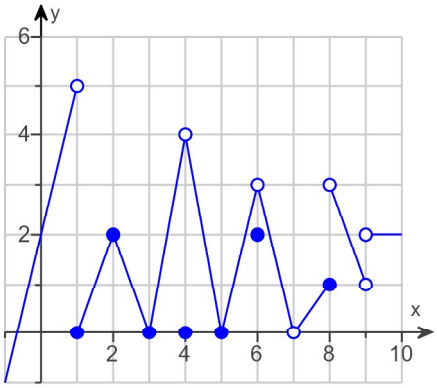
Student: Cole Lamers **Date:** 08/30/19	**Instructor:** Viktoriya Shcherban **Course:** Calc 1 11:30 AM / Internet (81749&81750) Shcherban	**Assignment:** 2.2 Limit of a Function and Limit Laws

1.

For the graph g(x) graphed below, find the following limits, if they exist.

a) $\lim_{x\to 5} g(x)$ b) $\lim_{x\to 1} g(x)$ c) $\lim_{x\to 7} g(x)$



a) Find $\lim_{x\to 5} g(x)$. Select the correct choice below and fill in any answer boxes in your choice.

- **A.** $\lim_{x\to 5} g(x) =$ 0
- **B.** The limit does not exist.

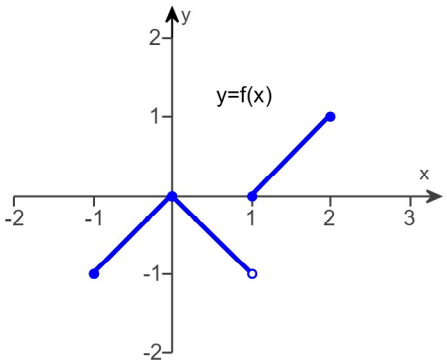
b) Find $\lim_{x\to 1} g(x)$. Select the correct choice below and fill in any answer boxes in your choice.

- **A.** $\lim_{x\to 1} g(x) =$
- **B.** The limit does not exist.

c) Find $\lim_{x\to 7} g(x)$. Select the correct choice below and fill in any answer boxes in your choice.

- **A.** $\lim_{x\to 7} g(x) =$ 0
- **B.** The limit does not exist.

2. Which of the following statements about the function y = f(x) graphed here are true, and which are false?



a. $\lim_{x\to 0} f(x)$ exists.

- [x] True
- [ ] False

b. $\lim_{x\to 0} f(x) = 0$.

- [x] True
- [ ] False

c. $\lim_{x\to 0} f(x) = -1$.

- [ ] True
- [x] False

d. $\lim_{x\to 1} f(x) = 1$.

- [x] False
- [ ] True

e. $\lim_{x\to 1} f(x) = 0$.

- [x] False
- [ ] True

f. $\lim_{x\to x_0} f(x)$ exists at every point x_0 in $(-1,1)$.

- [x] True
- [ ] False

3. Explain why the limit does not exist.

$$\lim_{x\to 0} \frac{x}{|x|}$$

Fill in the blanks in the following statement, and then answer the multiple choice below.

As x approaches 0 from the left, $\frac{x}{|x|}$ approaches -1. As x approaches 0 from the right, $\frac{x}{|x|}$ approaches 1.

- [ ] **A.** Since the function is not defined at x = 0, there is no way of knowing the limit as $x\to 0$.
- [x] **B.** There is no single number L that the function values all get arbitrarily close to as $x\to 0$.

4. If $\lim_{x\to 1} f(x) = 5$, must f be defined at x = 1? If it is, must f(1) = 5? Can anything be concluded about the values of f at x = 1? Explain.

Must f be defined at x = 1?

- [x] No
- [ ] Yes

If f is defined at x = 1, must f(1) = 5?

- [ ] **A.** Yes, because if it is defined at x = 1, the f(1) must equal $\lim_{x\to 1} f(x)$.
- [x] **B.** No, because it might be a piecewise function where the limit approaching 1 from the left and the limit approaching 1 from the right are the same, but f(1) might be defined as a different value.
- [ ] **C.** No, because even if a function is defined at a particular point, it may not exist at that point.

Can anything be concluded about the values of f at x = 1?

- [ ] **A.** Yes, f(1) must equal 5.
- [x] **B.** No, nothing can be concluded without knowing more about the definition of f.

5. Find the limit as x approaches −5 for the function f(x) = 12x + 1.

$\lim_{x\to -5} (12x + 1) =$ −59

(Simplify your answer.)

6. Find the limit as t approaches 1 for the function f(t) = 9(t − 8)(t − 8).

$\lim_{t\to 1} 9(t - 8)(t - 8) =$ 441

(Simplify your answer.)

7. Evaluate the following limit.

$$\lim_{x\to 4} \left(2x^3 - 5x^2 + 2x + 7\right)$$

$\lim_{x\to 4} \left(2x^3 - 5x^2 + 2x + 7\right) =$ 63 (Simplify your answer.)

8. Find the following limit.

$$\lim_{x\to 6} \frac{x + 1}{x^2 + 3x + 2}$$

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

- [x] **A.** $\lim_{x\to 6} \frac{x + 1}{x^2 + 3x + 2} =$ $\frac{1}{8}$ (Simplify your answer.)
- [ ] **B.** The limit does not exist.

9. Find $\lim_{x\to 8} \frac{x-8}{x^2-64}$.

$\lim_{x\to 8} \frac{x-8}{x^2-64} =$ $\frac{1}{16}$

(Type an integer or a simplified fraction.)

10. Find the limit.

$$\lim_{x\to 8} \frac{x^2-4x-32}{x-8}$$

$\lim_{x\to 8} \frac{x^2-4x-32}{x-8} =$ 12 (Type an integer or a simplified fraction.)

11. Find the limit.

$$\lim_{x\to 9} \frac{x^2-6x-27}{x-9}$$

$\lim_{x\to 9} \frac{x^2-6x-27}{x-9} =$ 12 (Type an integer or a simplified fraction.)

12. Find $\lim_{t\to 10} \frac{t^2+3t-130}{t^2-100}$.

$\lim_{t\to 10} \frac{t^2+3t-130}{t^2-100} =$ $\frac{23}{20}$

(Type an integer or a simplified fraction.)

13. Find $\lim_{x\to 49} \frac{\sqrt{x}-7}{x-49}$.

$\lim_{x\to 49} \frac{\sqrt{x}-7}{x-49} =$ $\frac{1}{14}$

(Type an integer or a simplified fraction.)

14. Find the limit.

$$\lim_{x\to 3} \frac{\sqrt{x^2+16}-5}{x-3}$$

$\lim_{x\to 3} \frac{\sqrt{x^2+16}-5}{x-3} =$ $\frac{3}{5}$ (Type an integer or a simplified fraction.)

15. Find the limit.

$$\lim_{x\to 0} (3\sin x - 1)$$

$\lim_{x\to 0} (3\sin x - 1) =$ -1 (Type an integer or a simplified fraction.)

16. Find the limit.

$$\lim_{x\to 0} \sec x$$

$\lim_{x\to 0} \sec x =$ 1 (Type an integer or a simplified fraction.)

17. Find the limit.

$$\lim_{x\to 0} \frac{3 + 4x + \sin x}{5\cos x}$$

$\lim_{x\to 0} \frac{3 + 4x + \sin x}{5\cos x} =$ $\frac{3}{5}$ (Type an integer or a simplified fraction.)

18. Suppose that $\lim_{x\to 6} f(x) = 10$ and $\lim_{x\to 6} g(x) = -10$. Find the following limits.

a. $\lim_{x\to 6} [f(x)g(x)]$ **b**. $\lim_{x\to 6} [6f(x)g(x)]$ **c**. $\lim_{x\to 6} [f(x) + 7g(x)]$ **d**. $\lim_{x\to 6} \left[\frac{f(x)}{f(x) - g(x)}\right]$

$\lim_{x\to 6} [f(x)g(x)] =$ -100
(Simplify your answer.)

$\lim_{x\to 6} [6f(x)g(x)] =$ -600
(Simplify your answer.)

$\lim_{x\to 6} [f(x) + 7g(x)] =$ -60
(Simplify your answer.)

$\lim_{x\to 6} \left[\frac{f(x)}{f(x) - g(x)}\right] =$ $\frac{1}{2}$
(Type a simplified fraction.)

19. Limits of the form $\lim_{h\to 0} \frac{f(x + h) - f(x)}{h}$ occur frequently in calculus. Evaluate this limit for the given value of x and function f.

$f(x) = x^2, \quad x = 6$

The value of the limit is 12. (Simplify your answer.)

20. Find $\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$ for the given function and value of x.

$f(x) = 2x - 7,\ x = 3$

The $\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$ for $f(x) = 2x - 7,\ x = 3$ is 2 .

(Type an integer or a simplified fraction.)

21. If $\sqrt{10-3x^2} \le f(x) \le \sqrt{10-x^2}$ for $-1 \le x \le 1$, find $\lim_{x\to 0} f(x)$.

$\lim_{x\to 0} f(x) =$ $\sqrt{10}$

(Type an exact answer, using radicals as needed.)