

# Classroom Voting Questions: Precalculus

## Limits

1. Consider the function:

$$f(x) = \begin{cases} 6 & \text{if } x > 9 \\ 2 & \text{if } x = 9 \\ -x + 14 & \text{if } -7 \leq x < 9 \\ 21 & \text{if } x < -7 \end{cases}$$

- (a)  $\lim_{x \rightarrow 9^-} f(x) = 2$
- (b)  $\lim_{x \rightarrow 9^-} f(x) = 5$
- (c)  $\lim_{x \rightarrow 9^-} f(x) = 6$
- (d)  $\lim_{x \rightarrow 9^-} f(x) = 14$
- (e)  $\lim_{x \rightarrow 9^-} f(x) = 21$

2. **True or False:** As  $x$  increases to 100,  $f(x) = 1/x$  gets closer and closer to 0, so the limit as  $x$  goes to 100 of  $f(x)$  is 0. Be prepared to justify your answer.

- (a) True, and I am very confident
- (b) True, but I am not very confident
- (c) False, but I am not very confident
- (d) False, and I am very confident

3. **True or False:**  $\lim_{x \rightarrow a} f(x) = L$  means that if  $x_1$  is closer to  $a$  than  $x_2$  is, then  $f(x_1)$  will be closer to  $L$  than  $f(x_2)$  is. Be prepared to justify your answer with an argument or counterexample.

- (a) True, and I am very confident
- (b) True, but I am not very confident
- (c) False, but I am not very confident
- (d) False, and I am very confident

4. The reason that  $\lim_{x \rightarrow 0} \sin\left(\frac{1}{x}\right)$  does not exist is:

- (a) because no matter how close  $x$  gets to 0, there are  $x$ 's near 0 for which  $\sin\left(\frac{1}{x}\right) = 1$ , and some for which  $\sin\left(\frac{1}{x}\right) = -1$ .
- (b) because the function values oscillate around 0.
- (c) because  $\frac{1}{0}$  is undefined.
- (d) all of the above

5.  $\lim_{x \rightarrow 0} x^2 \sin\left(\frac{1}{x}\right)$

- (a) does not exist because no matter how close  $x$  gets to 0, there are  $x$ 's near 0 for which  $\sin\left(\frac{1}{x}\right) = 1$ , and some for which  $\sin\left(\frac{1}{x}\right) = -1$ .
- (b) does not exist because the function values oscillate around 0.
- (c) does not exist because  $\frac{1}{0}$  is undefined.
- (d) equals 0
- (e) equals 1

6. You're trying to guess  $\lim_{x \rightarrow 0} f(x)$ . You plug in  $x = 0.1, 0.01, 0.001, \dots$  and get  $f(x) = 0$  for all of these values. In fact you're told that for all  $n = 1, 2, \dots$ ,  $f\left(\frac{1}{10^n}\right) = 0$ . **True or False:** Since the sequence  $f(0.1), f(0.01), f(0.001), \dots$  goes to 0, we know that  $\lim_{x \rightarrow 0} f(x) = 0$ .

- (a) True, and I am very confident
- (b) True, but I am not very confident
- (c) False, but I am not very confident
- (d) False, and I am very confident

7. If  $\lim_{x \rightarrow a} f(x) = 0$  and  $\lim_{x \rightarrow a} g(x) = 0$ , then  $\lim_{x \rightarrow a} \frac{f(x)}{g(x)}$

- (a) does not exist.
- (b) must exist.
- (c) can't be determined. Not enough information is given.

8. **True or False:** Consider a function  $f(x)$  with the property that  $\lim_{x \rightarrow a} f(x) = 0$ . Now consider another function  $g(x)$  also defined near  $a$ . Then  $\lim_{x \rightarrow a} [f(x)g(x)] = 0$ .

- (a) True, and I am very confident
- (b) True, but I am not very confident
- (c) False, but I am not very confident

(d) False, and I am very confident

9. If a function  $f$  is not defined at  $x = a$ ,

- (a)  $\lim_{x \rightarrow a}$  cannot exist.
- (b)  $\lim_{x \rightarrow a}$  could be 0.
- (c)  $\lim_{x \rightarrow a}$  must approach  $\infty$ .
- (d) none of the above

10. Possible criteria for continuity at a point: *If the limit of the function exists at a point, the function is continuous at that point.* Which of the following examples fits the above criteria but is not continuous at  $x = 0$ ?

- (a)  $f(x) = x$
- (b)  $f(x) = x^2/x$
- (c)  $f(x) = |x|/x$
- (d) None of these show a problem with this criteria.

11. Let  $f(x) = 5x^4 + 18x^3 - 2x + 3$ . As  $x$  gets really big, what becomes the most important (dominant) term in this function?

- (a)  $5x^4$
- (b)  $18x^3$
- (c)  $-2x$
- (d) 3

12. What is

$$\lim_{x \rightarrow \infty} \frac{6x^2 - 5x}{2x^2 + 3}?$$

- (a) 0
- (b) 2
- (c) 3
- (d) 6
- (e) infinity

13. What is

$$\lim_{x \rightarrow \infty} \frac{3x^2 + 5x^3 - 2x + 4}{4x^3 - 5x + 6}?$$

- (a) 0
- (b)  $2/3$
- (c)  $3/4$
- (d)  $5/4$
- (e) infinity

14. What is

$$\lim_{x \rightarrow \infty} \frac{100x^5 - 15x}{x^6 + 3}?$$

- (a) 0
- (b)  $5/6$
- (c) 85
- (d) 100
- (e) infinity

15. What is

$$\lim_{x \rightarrow \infty} \frac{x^2 + 2x + 3}{25x - 7}?$$

- (a) 0
- (b)  $1/25$
- (c)  $3/7$
- (d) 2
- (e) infinity

16. Let  $f(x) = \frac{x^2 - 4x + 3}{x^2 - 1}$ . Evaluate  $\lim_{x \rightarrow -1^+} f(x)$ .

- (a)  $-1$
- (b)  $\infty$
- (c)  $-\infty$

17. Find  $\lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x - 1}$ .

- (a)  $\infty$
- (b)  $-\infty$
- (c) 0
- (d) 1
- (e) The limit does not exist
- (f) None of the above

18. Find  $\lim_{x \rightarrow -2} \frac{x^2+x+1}{x+2}$ .

- (a)  $\infty$
- (b)  $-\infty$
- (c) 0
- (d) 1
- (e) The limit does not exist
- (f) None of the above