

Calculus AB
Chapter 2 Review Answers

1. Be sure to show algebraic steps for all parts of question 1 and/or EXPLAIN if you answered DNE...we will discuss explanations in class...

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|--------------------|------------------|-------------------|
| a) DNE | b) DNE | c) $\frac{1}{3}$ |
| d) -15 | e) 0 | f) $\frac{1}{2}$ |
| g) 0 | h) $\frac{5}{3}$ | i) 0 |
| j) $-\frac{9}{2}$ | k) DNE | l) $-\frac{7}{4}$ |
| m) DNE | n) DNE | o) DNE |
| p) $\frac{-1}{25}$ | q) $\frac{1}{6}$ | r) $\frac{3}{5}$ |

2. $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x = e$ 3. $\lim_{x \rightarrow 2^+} \left(\frac{x+3}{x-2}\right)$ DNE because as $x \rightarrow 2^+$, the function grows w/o bound.

4. $\lim_{x \rightarrow \infty} f(x) = \frac{3}{2}$; $\lim_{x \rightarrow \infty} g(x) = \frac{1}{2}$

5. a) VA: $x = 0$ because $\lim_{x \rightarrow 0} y = -\infty$ b) HA: $y = 1$ because $\lim_{x \rightarrow \infty} f(x) = 1$
 VA: $x = 1$ because $\lim_{x \rightarrow 1^+} f(x) = -\infty$
 c) HA: $y = 0$ because $\lim_{x \rightarrow \infty} f(x) = 0$ d) No HA. SA: $y = x - 4$
 VA: $x = 0$ because $\lim_{x \rightarrow 0^+} f(x) = -\infty$ VA: $x = -2$ because $\lim_{x \rightarrow -2^+} f(x) = \infty$
 $x = -2$ because $\lim_{x \rightarrow -2^+} f(x) = -\infty$ $x = 1$ because $\lim_{x \rightarrow 1^-} f(x) = \infty$

6. a) $\frac{x^2}{x} = x$
 b) $\lim_{x \rightarrow \infty} y = \infty$; $\lim_{x \rightarrow -\infty} y = -\infty$... These limits DNE but because we are describing y 's behavior, we can use ∞ .
 c) VA: $x = 2$; SA: $y = x + 7$

7. a) $p(0) = 25$; There were 25 bears in the wildlife reserve at $t = 0$ (initially).
 b) $\lim_{t \rightarrow \infty} p(t) = 200$; The maximum number of bears the wildlife reserve can sustain is 200 bears.

8. $\lim_{x \rightarrow c} h(x)$ exists for all c on the interval $(-\infty, 2) \cup (2, \infty)$.

9. $\lim_{x \rightarrow c} f(x)$ exists for all c on the interval $(-2, 0) \cup (0, 2) \cup (2, 3)$.

10. a) 1 b) 3 c) 3 d) 3

e) 1 f) 4 g) DNE because $\lim_{x \rightarrow 4^+} f(x) \neq \lim_{x \rightarrow 4^-} f(x)$ h) 3.5

11. The function is continuous for all x values on the interval $[-1, 3) \cup (3, 4) \cup (4, 6]$.

12. The function is not continuous at $x = 3$ and $x = 4$.

13. $x = 3$ is a removable discontinuity. To make the function continuous at $x = 3$, reassign $f(3) = 3$ instead of 2.

14. a) $\lim_{x \rightarrow -1^-} f(x) = 2$; $\lim_{x \rightarrow -1^+} f(x) = 2$ $\lim_{x \rightarrow 0^-} f(x) = 1$; $\lim_{x \rightarrow 0^+} f(x) = 1$ $\lim_{x \rightarrow 1^-} f(x) = 0$; $\lim_{x \rightarrow 1^+} f(x) = 2$

b) $\lim_{x \rightarrow -1} f(x) = 2$ and $\lim_{x \rightarrow 0} f(x) = 1$ because the left hand and right hand limits are equal.

f does not have a limit as x approaches 1 because $\lim_{x \rightarrow 1^-} f(x) \neq \lim_{x \rightarrow 1^+} f(x)$

c) f cannot be continuous at $x = 1$ because $\lim_{x \rightarrow 1} f(x)$ DNE.

f is continuous at $x = -1$ because $\lim_{x \rightarrow -1} f(x) = f(-1)$.

f is not continuous at $x = 0$ because $\lim_{x \rightarrow 0} f(x) \neq f(0)$.