Worksheet: Limits | AP Calculus AB | apmath.github.io

Name: ____

SHOW YOUR WORK FOR CREDIT! **No Calculators**

1) $\lim\limits_{x \to 2} -x^2 + 4x$

a) 0 b) 12 c) 4 d) -12 e) None of these

2) $\lim\limits_{x \to 3} \dfrac{\sqrt{5x+10}}{x-3}$

a) indeterminate b) does not exist c) 25 d) 1 e) None of these

3) $\lim\limits_{x \to 0} \dfrac{x}{\tan x}$

4) $\lim\limits_{x \to 0^-} 1 + \dfrac{1}{x}$

a) 1 b) $-\infty$ $\therefore$ does not exist c) ∞ $\therefore$ does not exist d) 1 e) None of these

5) $\lim\limits_{x \to 1} \sin \pi x$

6) True or False: If f is undefined at x = c, then the limit of f(x) as x approaches c does not exist.

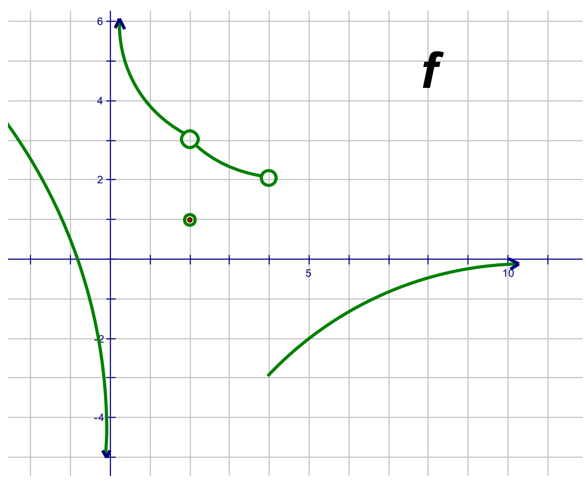
7) True of False: If the $\lim\limits_{x \to c} f(x) = L$ then f(c) = L.

8) $\lim\limits_{x \to 2} f(x)$ when $f(x) = \begin{cases} x^2 - 3x + 6 & \text{when } x < 2 \\ -x^2 + 3x + 2 & \text{when } x \geq 2 \end{cases}$

9) Find a ***c*** such that f(x) is continuous on the entire real line.

$$f(x) = \begin{cases} x^2 & \text{when } x \leq 4 \\ \dfrac{c}{x} & \text{when } x > 4 \end{cases}$$

Use the graph at the right to answer questions 10 – 13.



10) $\lim\limits_{x \to 2} f(x) =$

11) $\lim\limits_{x \to 4^{+}} f(x) =$

12) $\lim\limits_{x \to 4^{--}} f(x) =$

13) $\lim\limits_{x \to 0} f(x) =$

14) Find the x-values (if any) at which f is discontinuous. Label as removable or non-removable.

$$f(x) = \frac{2x+6}{2x^2 - 18}$$

a) x = 3 only….Non-removable
b) x = - 3 only…Non-removable
c) x = 3 and x = -3…Both non-removable
d) x = -3…Removable, x = 3…Non-removable
e) There are no discontinuities

15) Determine all of the vertical asymptotes of f(x):

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

a) V.A at x = 2 only   b) V.A. at x = -2 only   c) V.A. at x = -2 and x = 2   d) No V.A's   e) None of these

16) AP TEST QUESTION: If $a \neq 0$, then $\lim\limits_{x \to -a} \dfrac{x^2 - a^2}{x^4 - a^4}$ is:

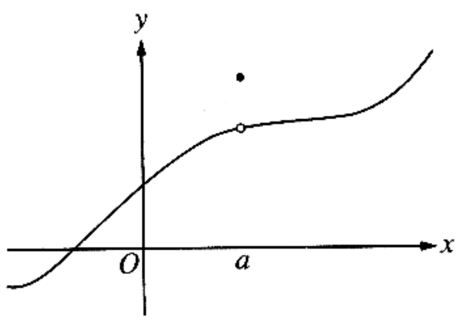
a) $\dfrac{1}{6a^2}$ b) 0 c) $\dfrac{1}{a^2}$ d) $\dfrac{1}{2a^2}$ e) Does not exist

17) AP TEST QUESTION: If the function f is continuous on the closed interval [0, 2] and has values that are given in the table below, then the equation f(x) = ½ must have at least TWO solutions in the interval [0, 2] if k = ? Hint! Draw a picture!

x	0	1	2
f(x)	1	k	2

a) 0
b) ½
c) 1
d) 2
e) 3

18) AP TEST QUESTION: The graph of the function f is shown to the right.
Which of the following statements is false?



a) x = a is in the domain of f.

b) $\lim\limits_{x \to a^+} f(x)$ is equal to $\lim\limits_{x \to a^-} f(x)$

c) $\lim\limits_{x \to a} f(x)$ exists

d) $\lim\limits_{x \to a}$ is not equal to f(a)

e) f is continuous at x = a

AP Calculus AB Name: ______________________________

Chapter One Test Period: ____

SHOW YOUR WORK FOR CREDIT! Calculators are okay!

1) Mr. Cook drops his calculus book off of the top of a 220-meter building.

a) Write a position function.

b) When will the book hit the ground? (Round to three decimal places)

c) Using the velocity function below, find the velocity of the book when t = 2.

Velocity function: $\lim\limits_{t \to a} \dfrac{s(a) - s(t)}{a - t}$

2) Approximate the limit ***numerically*** by completing the table:

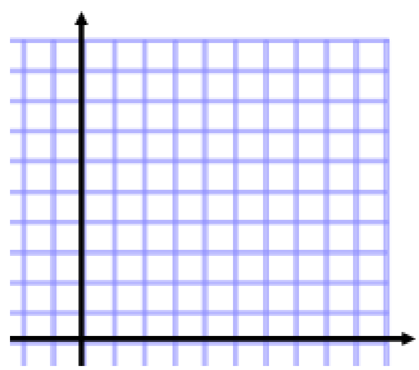
$$\lim_{x \to -2} \frac{x^2}{x - 2} = \_\_\_\_\_\_\_\_\_\_$$

x	1.9	1.99	1.999	2	2.001	2.01	2.1
f(x)							

3) Find a function f(x) such that f(x) has a gap at x = 7 and a vertical asymptote at x = -4.

4) On the graph to the right, draw a function that has the following properties:

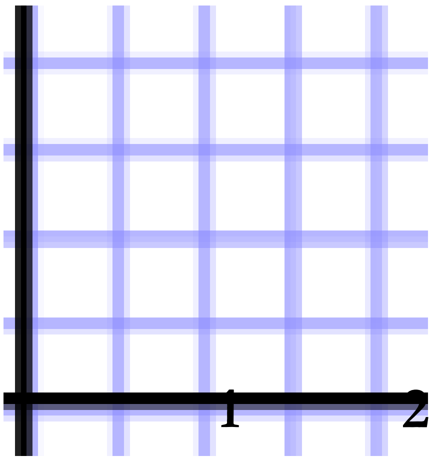
- A step (or jump) discontinuity at x = 5
- f(5) = 6.



5) Find the limit: $\lim\limits_{\Delta x \to 0} \dfrac{(x+\Delta x)^2 - 2(x+\Delta x) + 1 - (x^2 - 2x + 1)}{\Delta x}$

6) Find the limit: $\lim\limits_{x \to 0} \cos \frac{1}{x}$

7) On the graph below, draw the function $y = 4 - x^2$ in the first quadrant. Then draw four ***circumscribed*** rectangles of equal width. Use these four rectangles to approximate the area of the region bounded by the function, the x-axis, and the y-axis.



8) Create a function such that the $\lim\limits_{x \to 5}$ does not exist because it is approaching $+\infty$ from both the left and the right. Show both the function and the graph.