A.P. Calculus BC Test One
Section One
Multiple-Choice
No Calculators
Time—30 minutes
Number of Questions—15

The scoring for this section is determined by the formula

$$[C - (0.25 \times I)] \times 1.8$$

where C is the number of correct responses and I is the number of incorrect responses. An unanswered question earns zero points. The maximum possible points earned on this section is 27, which represents 50% of the total test score.

Directions: Solve each of the following problems, using the available space for scratch work. After examining the form of the choices, decide which is the best of the choices given and fill in the corresponding choice on your answer sheet. Do not spend too much time on any one problem.

Good Luck!

NAME:

1. Which of the following are asymptotes of $y + xy - 2x = 0$?

$$
\begin{array}{ll}
\text{I.} & x = -1 \\
\text{II.} & x = 1 \\
\text{III.} & y = 2
\end{array}
$$

A) I only

B) II only

C) III only

D) I and III only

E) II and III only

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2. Given that the function f is continuous at the point $(c, f(c))$, determine which of the following statements could be false.

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

B) $\lim\limits_{x \to c} f(x) = f(c)$.

C) $\lim\limits_{x \to c^-} f(x) = \lim\limits_{x \to c^+} f(x)$.

D) $f(c)$ is defined.

E) $\lim\limits_{x \to c} f(x) = c$.

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3. If f is continuous at $x = 2$, and if f is defined as

$$
f(x) = \begin{cases} \dfrac{\ln x^2 - x \ln x}{x - 2} & x \neq 2 \\ k & x = 2, \end{cases}
$$

then k is

A) -1

B) -2

C) $-\frac{e}{4}$

D) $-\ln 2$

E) undefined

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4. Which of the following functions is *not* continuous for all real numbers x ?

  A) $f(x) = x^{1/3}$

  B) $f(x) = \dfrac{2}{(x+1)^4}$

  C) $f(x) = |x+1|$

  D) $f(x) = \sqrt{1 + e^x}$

  E) $f(x) = \dfrac{x-3}{x^2+9}$

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5. $\displaystyle\lim_{x \to 10} \dfrac{4x^2 - 6x + 10}{50 + 4x^2} =$

  A) -1

  B) 0

  C) $\frac{7}{9}$

  D) 1

  E) ∞

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6. $\displaystyle\lim_{x \to 2} \dfrac{x^2 - 4}{x^3 - 8} =$

  A) 0

  B) $\frac{1}{3}$

  C) $\frac{1}{2}$

  D) $\frac{2}{3}$

  E) Does not exist

7. $\displaystyle\lim_{x\to\infty} \frac{x^3 - 4x + 1}{2x^3 - 5} =$

    A) $-\frac{1}{5}$

    B) $\frac{1}{2}$

    C) $\frac{2}{3}$

    D) 1

    E) Does not exist
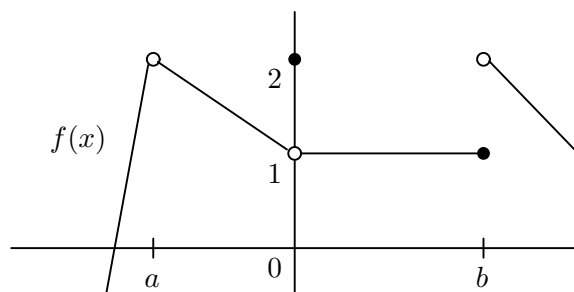
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8. $\displaystyle\lim_{\theta\to 0} \frac{\sin^2\theta}{\cos\theta} =$

    A) -1

    B) $-\frac{1}{2}$

    C) 0

    D) $\frac{1}{2}$

    E) 1

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9. Which of the following values for k makes the function f defined below continuous at $x = 0$?

$$f(x) = \begin{cases} \ln(x + k) & 0 < x < 3 \\ \cos(kx) & x \le 0 \end{cases}$$

    A) 0

    B) 1

    C) $\frac{\pi}{2}$

    D) e

    E) π

10. The graph of the function f is shown in the figure above. Which one of the following statements about f is true?

      A) $f(a)$ exists.

      B) $\lim\limits_{x \to a} f(x) = 2$.

      C) $\lim\limits_{x \to b} f(x) = 1$.

      D) $\lim\limits_{x \to b^-} f(x) = \lim\limits_{x \to b^+} f(x)$.

      E) f is continuous at $x = 0$.

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11. $\lim\limits_{x \to 0^-} \dfrac{1}{x} =$

      A) ∞

      B) $-\infty$

      C) 0

      D) 1

      E) does not exist

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12. The function

$$G(x) = \begin{cases} x + 1 & x > 2 \\ -5 & x = 2 \\ 5x - 7 & x < 2 \end{cases}$$

is not continuous at $x = 2$ because

      A) $G(2)$ is not defined.

      B) $\lim\limits_{x \to 2} G(x)$ does not exist.

      C) $\lim\limits_{x \to 2} G(x) \neq G(2)$.

      D) $G(2) \neq -5$.

      E) None of the above

13. $\lim\limits_{x \to -1/2^-} \dfrac{2x^2 - 3x - 2}{2x + 1} =$

      A) ∞

      B) $-\infty$

      C) 1

      D) $\frac{3}{2}$

      E) $-\frac{5}{2}$

14. Let $p(x) = \dfrac{|x-4|}{x-4}$. Which of the following best describes the behavior of p at $x = 4$?

      A) vertical asymptote

      B) horizontal asymptote

      C) cusp

      D) jump discontinuity

      E) oscillation

15. $\lim\limits_{x \to -\infty} \dfrac{2x^3 + 3x^2 + 5}{x^4 + 7x^2 - 3} =$

      A) 0

      B) 2

      C) $\frac{3}{7}$

      D) ∞

      E) $-\infty$