Uncommon Schools | Change History.

# AP Calculus BC

## Q3 Interim Assessment

## Test Booklet 2

## Multiple Choice (Calc Active)

## March 2018

School: _____

Student Name: _____

Teacher: _____

Period: _____

**CALCULUS BC**

**SECTION I, Part B**

**Time—45 minutes**

**Number of questions—15**

**A GRAPHING CALCULATOR IS REQUIRED FOR SOME QUESTIONS ON THIS PART OF THE EXAM.**

**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 place the letter of your choice in the corresponding box on the answer sheet. No credit will be given for anything written in this exam booklet. Do not spend too much time on any one problem.

**In this exam:**

(1) The exact numerical value of the correct answer does not always appear among the choices given. When this happens, select from among the choices the number that best approximates the exact numerical value.

(2) Unless otherwise specified, the domain of a function $f$ is assumed to be the set of all real numbers $x$ for which $f(x)$ is a real number.

(3) The inverse of a trigonometric function $f$ may be indicated using the inverse function notation $f^{-1}$ or with the prefix "arc" (e.g., $\sin^{-1} x = \arcsin x$).

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76. If $f'(x) = \sqrt{1 + 2x^3}$ and $f(2) = 0.4$, then $f(5) =$

(A) 29.005 (B) 28.605 (C) 28.205 (D) $-28.205$

| $x$ | $-0.2$ | 0 | 0.2 | 0.4 |
|---|---|---|---|---|
| $f'(x)$ | 0.8 | 1.2 | 1.7 | 2.3 |

77. The table above shows values of $f'$, the derivative of a function $f$, for selected values of $x$. If $f(-0.2) = 1$, what is the approximation for $f(0.4)$ obtained by using Euler's method with a step size of 0.2 starting at $x = -0.2$ ?

(A) 1.48 (B) 1.74 (C) 2.04 (D) 2.20

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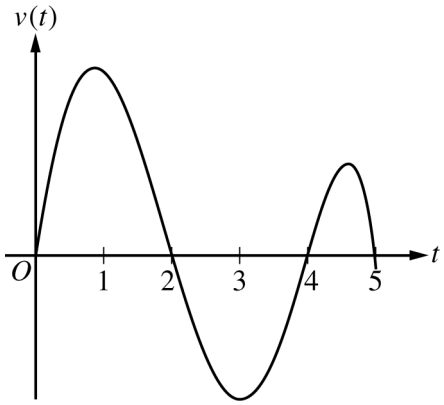
78. The second derivative of a function $f$ is given by $f''(x) = \sin(3x) - \cos(x^2)$. How many points of inflection does the graph of $f$ have on the interval $0 < x < 3$ ?

(A) One (B) Three (C) Four (D) Five

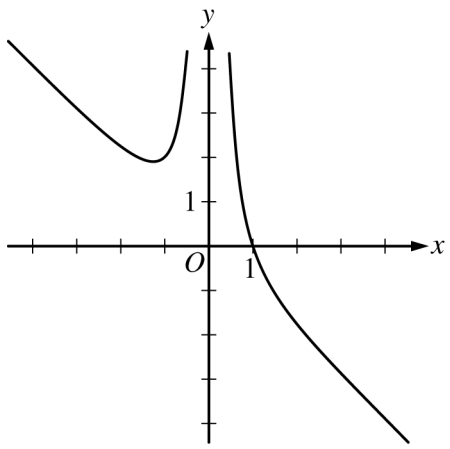



79. Over the time interval $0 \le t \le 5$, a particle moves along the $x$-axis. The graph of the particle's velocity, $v$, is shown above. Over the time interval $0 \le t \le 5$, the particle's displacement is 3 and the particle travels a total distance of 13. What is the value of $\int_2^4 v(t)\,dt$ ?

(A) $-10$ (B) $-5$ (C) 5 (D) 10

80. What is the total area between the polar curves $r = 5\sin(3\theta)$ and $r = 8\sin(3\theta)$ ?

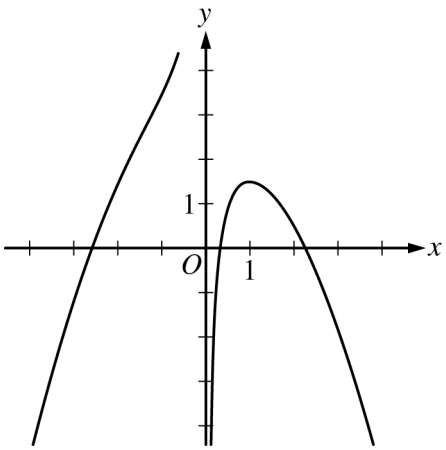
(A) 2.000 (B) 7.069 (C) 30.631 (D) 61.261



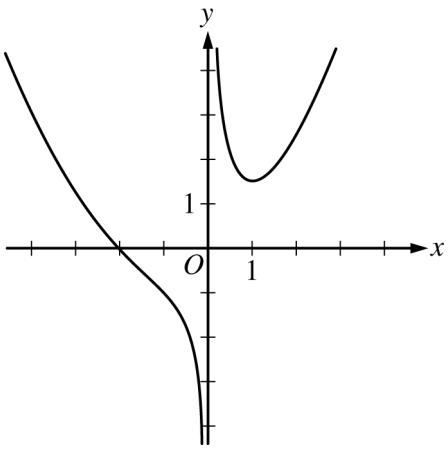

Graph of $f'$

81. The graph of $f'$, the derivative of the function $f$, is shown above. Which of the following could be the graph of $f$ ?

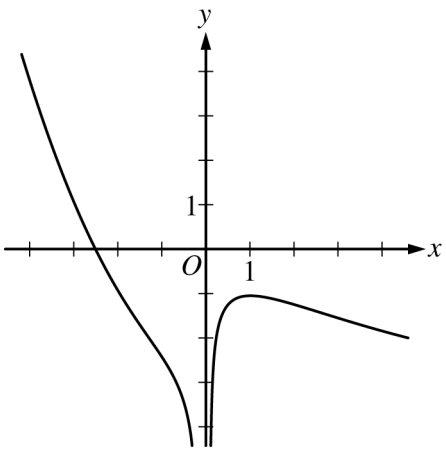
(A)



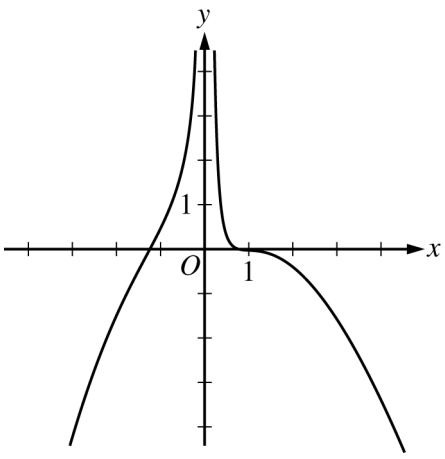

(B)




(C)




(D)

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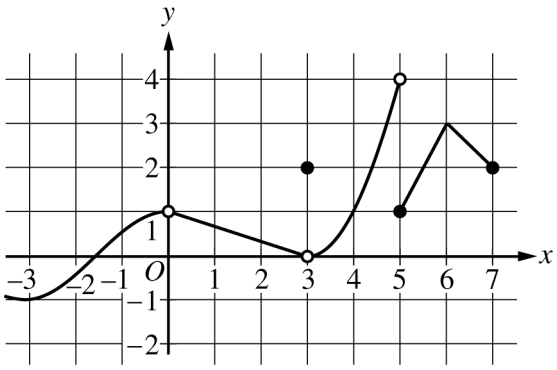
82. On a certain day, the total number of pieces of candy produced by a factory since it opened is modeled by $C$, a differentiable function of the number of hours since the factory opened. Which of the following is the best interpretation of $C'(3) = 500$ ?

(A) The factory produces 500 pieces of candy during its 3rd hour of operation.

(B) The factory produces 500 pieces of candy in the first 3 hours after it opens.

(C) The factory is producing candy at a rate of 500 pieces per hour, 3 hours after it opens.

(D) The rate at which the factory is producing candy is increasing at a rate of 500 pieces per hour per hour, 3 hours after it opens.




Graph of $f$

83. The graph of the function $f$ is shown above. Which of the following statements is true?

(A) $f$ is discontinuous at $x = 0$ because $\lim_{x \to 0} f(x)$ does not exist.

(B) $f$ is discontinuous at $x = 3$ because $\lim_{x \to 3} f(x) \neq f(3)$.

(C) $f$ is discontinuous at $x = 5$ because $\lim_{x \to 5^-} f(x)$ does not exist.

(D) $f$ is discontinuous at $x = 6$ because $\lim_{x \to 6^-} f'(x) \neq \lim_{x \to 6^+} f'(x)$.

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84. At time $t = 0$ minutes, a tank contains 48 gallons of water. For $0 \le t \le 4$ minutes, water flows into the tank at a rate of $E(t) = 12t \sin\left(\frac{\pi}{4}t\right)$ gallons per minute, and water leaks out of the tank at a rate of $L(t) = \frac{6t^2}{t+2}$ gallons per minute. How many gallons of water are in the tank at time $t = 4$ minutes?

(A) 13.251 (B) 82.749 (C) 87.482 (D) 135.482

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85. What is the average value of $y = \tan\left(\frac{x^2}{9}\right)$ on the closed interval $[1.25, 2]$ ?

(A) 0.116 (B) 0.232 (C) 0.310 (D) 0.326

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| $\lim_{x \to -5} f(x) = 4$ | $\lim_{x \to 5} f(x) = 2$ | $\lim_{x \to 5} g(x) = 5$ |
|---|---|---|

86. The table above gives selected limits of the functions $f$ and $g$. What is $\lim_{x \to 5} (f(-x) + 3g(x))$ ?

(A) 19 (B) 17 (C) 13 (D) 9

87. A tire that is leaking air has an initial air pressure of 30 pounds per square inch (psi). The function $t = f(p)$ models the amount of time $t$, in hours, it takes for the air pressure of the tire to reach $p$ psi. What are the units for $f'(p)$ ?

(A) hours (B) psi (C) psi per hour (D) hours per psi

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88. The position of a particle moving in the $xy$-plane is given by the parametric equations $x(t) = \cos(2^t)$ and $y(t) = \sin(2^t)$ for time $t \geq 0$. What is the speed of the particle when $t = 2.3$ ?

(A) 1.000 (B) 2.014 (C) 3.413 (D) 11.652

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89. The function $f$ is defined on the closed interval [0, 1] and satisfies $f(0) = f\left(\frac{1}{2}\right) = f(1)$. On the open interval $(0, 1)$, $f$ is continuous and strictly increasing. Which of the following statements is true?

(A) $f$ attains both a minimum value and a maximum value on the closed interval [0, 1].

(B) $f$ attains a minimum value but not a maximum value on the closed interval [0, 1].

(C) $f$ attains a maximum value but not a minimum value on the closed interval [0, 1].

(D) $f$ attains neither a minimum value nor a maximum value on the closed interval [0, 1].

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90. The power series $\sum_{n=0}^{\infty} a_n(x-1)^n$ converges conditionally at $x = 5$. Which of the following statements about convergence of the series at $x = -4$ is true?

(A) The series converges absolutely at $x = -4$.

(B) The series converges conditionally at $x = -4$.

(C) The series diverges at $x = -4$.

(D) There is not enough information given to determine convergence of the series at $x = -4$.

**END OF SECTION I**

**IF YOU FINISH BEFORE TIME IS CALLED,**
**YOU MAY CHECK YOUR WORK ON PART B ONLY.**

**DO NOT GO ON TO SECTION II UNTIL YOU ARE TOLD TO DO SO.**