Uncommon Schools | Change History.

AP Calculus AB

Q3 Interim Assessment

MC Test Booklet #2

April 2017

School: _____

Student Name: _____

Teacher: _____

Period: _____

AP® Calculus AB Exam

SECTION I: Multiple Choice

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

At a Glance

Total Time
1 hour, 45 minutes
Number of Questions
45
Percent of Total Score
50%
Writing Instrument
Pencil required

Part A

Number of Questions
30
Time
60 minutes
Electronic Device
None allowed

Part B

Number of Questions
15
Time
45 minutes
Electronic Device
Graphing calculator required

Instructions

Section I of this exam contains 45 multiple-choice questions. For Part A, fill in only the boxes for numbers 1 through 30 on the answer sheet. For Part B, fill in only the boxes for numbers 76 through 90 on the answer sheet.

Indicate all of your answers to the multiple-choice questions on the answer sheet. No credit will be given for anything written in this exam booklet, but you may use the booklet for notes or scratch work. After you have decided which of the suggested answers is best, place the letter of your choice in the corresponding box on the answer sheet. Give only one answer to each question.

Use your time effectively, working as quickly as you can without losing accuracy. Do not spend too much time on any one question. Go on to other questions and come back to the ones you have not answered if you have time. It is not expected that everyone will know the answers to all of the multiple-choice questions.

Your total score on the multiple-choice section is based only on the number of questions answered correctly. Points are not deducted for incorrect answers or unanswered questions.

B B B B B B B B B

CALCULUS AB

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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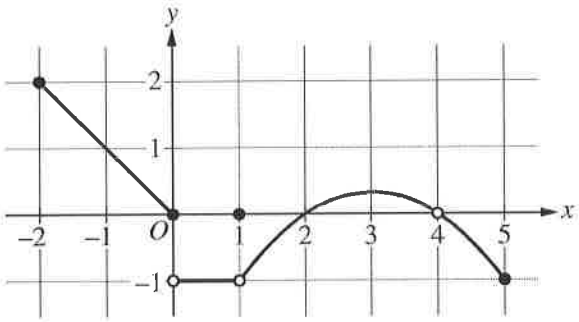
76. To help restore a beach, sand is being added to the beach at a rate of $s(t) = 65 + 24\sin(0.3t)$ tons per hour, where t is measured in hours since 5:00 A.M. How many tons of sand are added to the beach over the 3-hour period from 7:00 A.M. to 10:00 A.M.?

(A) 255.368 (B) 225.271 (C) 85.123 (D) 10.388



Graph of f

77. The graph of the function f is shown above. For what values of a does $\lim_{x \to a} f(x) = 0$?

(A) 2 only

(B) 2 and 4

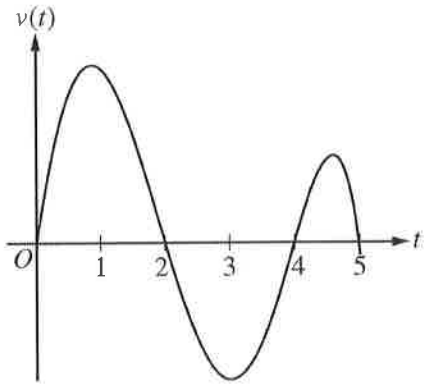
(C) 0 and 2 only

(D) 0, 1, and 2

GO ON TO THE NEXT PAGE.

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

GO ON TO THE NEXT PAGE.

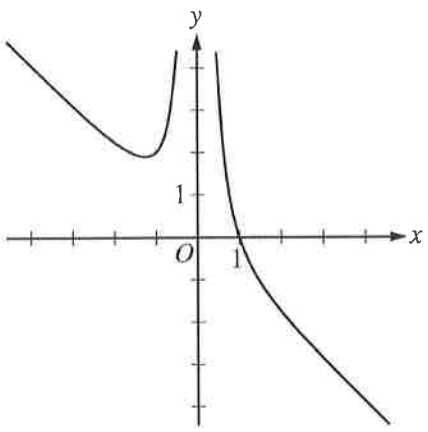
80. The temperature in a room at midnight is 20 degrees Celsius. Over the next 24 hours, the temperature changes at a rate modeled by the differentiable function H, where $H(t)$ is measured in degrees Celsius per hour and time t is measured in hours since midnight. Which of the following is the best interpretation of $\int_0^6 H(t)\,dt$?

(A) The temperature of the room, in degrees Celsius, at 6:00 A.M.

(B) The average temperature of the room, in degrees Celsius, between midnight and 6:00 A.M.

(C) The change in the temperature of the room, in degrees Celsius, between midnight and 6:00 A.M.

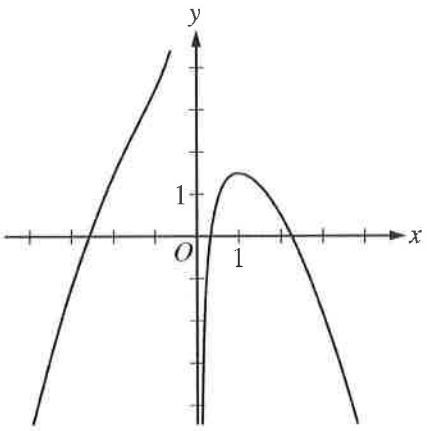
(D) The rate at which the temperature in the room is changing, in degrees Celsius per hour, at 6:00 A.M.



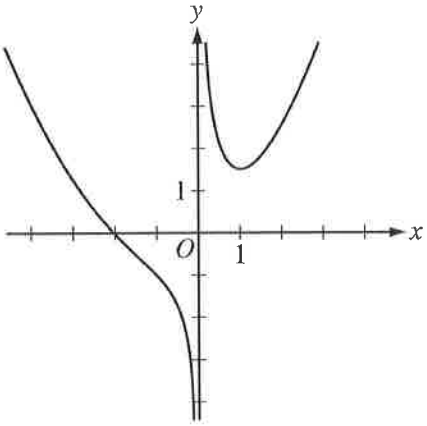
Graph of f'

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

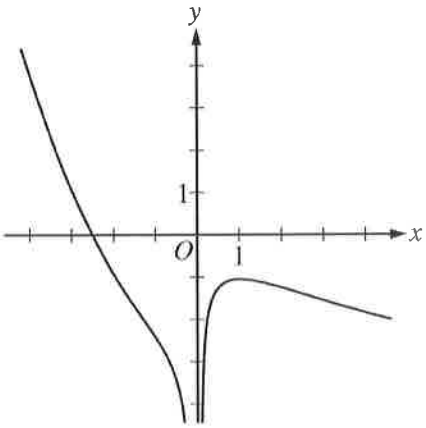
(A)



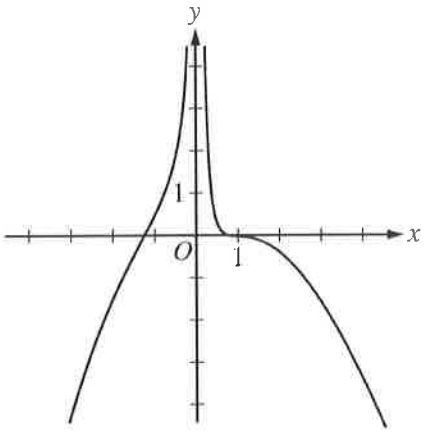
(B)



(C)



(D)



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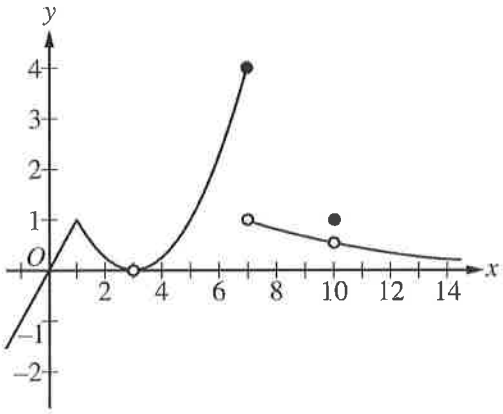
82. Let f be the function with derivative given by $f'(x) = \sin(x^2 - 3)$. At what values of x in the interval $-3 < x < 3$ does f have a relative maximum?

(A) -1.732 and 2.478 only

(B) -2.478 and 1.732 only

(C) -2.138, 0, and 2.138

(D) -2.478, -1.732, 1.732, and 2.478



Graph of f

83. The graph of the function f is shown above. At what value of x does f have a jump discontinuity?

(A) 1 (B) 3 (C) 7 (D) 10

84. Let f be a differentiable function such that $f(1) = \pi$ and $f'(x) = \sqrt{x^3 + 6}$. What is the value of $f(5)$?

(A) 11.941 (B) 14.587 (C) 24.672 (D) 27.814

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85. People are entering a building at a rate modeled by $f(t)$ people per hour and exiting the building at a rate modeled by $g(t)$ people per hour, where t is measured in hours. The functions f and g are nonnegative and differentiable for all times t. Which of the following inequalities indicates that the rate of change of the number of people in the building is increasing at time t ?

(A) $f(t) > 0$

(B) $f'(t) > 0$

(C) $f(t) - g(t) > 0$

(D) $f'(t) - g'(t) > 0$

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86. The velocity of a particle moving along the x-axis is given by $v(t) = \sqrt{t} - \cos(e^t)$ for $t \geq 0$. Which of the following statements describes the motion of the particle at $t = 1$?

(A) The particle is moving to the left with positive acceleration.

(B) The particle is moving to the right with positive acceleration.

(C) The particle is moving to the left with negative acceleration.

(D) The particle is moving to the right with negative acceleration.

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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 first derivative of the function f is defined by $f'(x) = \dfrac{x + 2e^{-x}}{x^2 + 0.7}$. On what intervals is f increasing?

(A) $-1.384 < x < -0.264$ only

(B) $x < -0.633$ and $x > 0.319$ only

(C) $-\infty < x < \infty$

(D) There are no intervals on which f is increasing.

x	0	4	6	8	13
$f(x)$	3	4.5	3	2.5	4.4

89. The table above shows selected values of a continuous function f. For $0 \le x \le 13$, what is the fewest possible number of times $f(x) = 4$?

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

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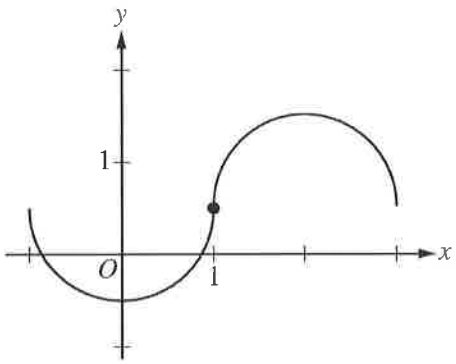

Graph of h'

90. The function h is defined on the closed interval $[-1, 3]$. The graph of h', the derivative of h, is shown above. The graph consists of two semicircles with a common endpoint at $x = 1$. Which of the following statements about h must be true?

I. $h(-1) = h(3)$

II. h is continuous at $x = 1$.

III. The graph of h has a vertical asymptote at $x = 1$.

(A) None (B) II only (C) I and II only (D) I and III only

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.