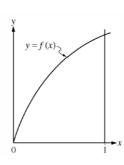
CALCULUS AB

PRACTICE EXAM Section I, Part B Time – 50 minutes Number of questions – 17

A CALCULATOR IS REQUIRED ON THIS PART OF THE EXAM.

- 1. A particle moves along the x-axis so that at any time $t \ge 0$ its velocity is given by $v(t) = t^2 \ln(t+2)$. What is the acceleration of the particle at time t = 6?
 - (A) 1.500 (B) 20.453
- (C) 29.453
- (D) 74.680
- (E) 133.417
- 2. If $\int_0^3 f(x)dx = 6$ and $\int_3^5 f(x)dx = 4$, then $\int_0^5 (3+2f(x))dx = 6$
 - (A) 10 (B) 20
- (C) 23
- (D) 35
- (E) 50

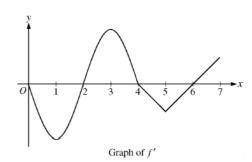
- 3. For t > 0 hours, H is a differentiable function of t that gives the temperature, in degrees Celsius, at an Arctic weather station. Which of the following is the best interpretation of H'(24)?
 - (A) The change in temperature during the first day
 - (B) The change in temperature during the 24th hour
 - (C) The average rate at which the temperature changed during the 24th hour
 - (D) The rate at which the temperature is changing during the first day
 - (E) The rate at which the temperature is changing at the end of the 24th hour
- 4. A spherical tank contains 81.637 gallons of water at time t = 0 minutes. For the next 6 minutes, water flows out of the tank at the rate of $9\sin(\sqrt{t+1})$ gallons per minute. How many gallons of water are in the tank at the end of the 6 minutes?
 - (A) 36.606
- (B) 45.031
- (C) 68.858
- (D) 77.355
- (E) 126.668



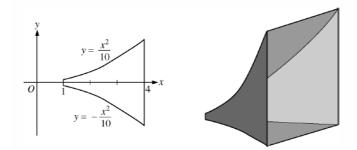
- 5. A left Riemann sum, a right Riemann sum, and a trapezoidal sum are used to approximate the value of $\int_0^1 f(x)dx$, each using the same number of subintervals. The graph of the function f is shown in the figure above. Which of the sums give an underestimate of the value of $\int_0^1 f(x)dx$?
 - I. Left sum
 - II. Right sum
 - III. Trapezoidal sum
 - (A) I only
- (B) II only
- (C) III only (D) I and III only
- (E) II and III only
- 6. The first derivative of the function f is given by $f'(x) = x 4e^{-\sin(2x)}$. How many points of inflection does the graph of f have on the interval $0 < x < 2\pi$?
 - (A) 3
- (B) 4
- (C) 5
- (D) 6
- (E) 7
- 7. If f is a continuous function on the closed interval [a, b], which of the following must be true?
 - (A) There is a number c in the open interval (a, b) such that f(c) = 0.
 - (B) There is a number c in the open interval (a, b) such that f(a) < f(c) < f(b).
 - (C) There is a number c in the open interval [a, b] such that $f(c) \ge f(x)$ for all x in [a, b].
 - (D) There is a number c in the open interval (a, b) such that f'(c) = 0.
 - (E) There is a number c in the open interval (a, b) such that $f'(c) = \frac{f(b) f(a)}{b a}$.

х	2.5	2.8	3.0	3.1
f(x)	31.25	39.20	45	48.05

- 8. The function f if differentiable and has values as shown in the table above. Both f and f' are strictly increasing on the interval $0 \le x \le 5$. Which of the following could be the value of f'(3)?
 - (A) 20
- (B) 27.5
- (C) 29
- (D) 30
- (E) 30.5



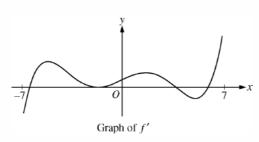
- 9. The graph of f', the derivative of the function f, is shown above. On which of the following intervals is f decreasing?
 - (A) [2, 4] only
 - (B) [3, 5] only
 - (C) [0, 1] and [3, 5]
 - (D) [2, 4] and [6, 7]
 - (E) [0, 2] and [4, 6]



- 10. The base of a loudspeaker is determined by the two curves $y = \frac{x^2}{10}$ and $y = -\frac{x^2}{10}$ for $1 \le x \le 4$, as shown above. For this loudspeaker, the cross sections perpendicular to the *x*-axis are squares. What is the volume of the loudspeaker, in cubic units?
 - (A) 2.046 (B) 4.092
- (C) 4.200
- (D) 8.184
- (E) 25.711

х	3	4	5	6	7
f(x)	20	17	12	16	20

- 11. The function f is continuous and differentiable on the closed interval [3, 7]. The table gives selected values of f on this interval. Which of the following statements must be true?
 - I. The minimum value of f on [3, 7] is 12.
 - II. There exists c, for 3 < c < 7, such that f'(c) = 0.
 - III. f'(x) > 0 for 5 < x < 7.
 - (A) I only
- (B) II only
- (C) III only
- (D) I and III only (E) I, II, and III



- 12. The figure above shows the graph of f', the derivative of the function f, on the open interval -7 < x < 7. If f' has four zeros on -7 < x < 7, how many relative maxima does f have on -7 < x < 7?
 - (A) 1
- (B) 2
- (C) 3
- (D) 4
- (E) 5
- 13. The rate at which water is sprayed on a field of vegetables is given by $R(t) = 2\sqrt{1+5t^3}$, where t is in minutes and R(t) is in gallons per minute. During the time interval 0 < t < 4, what is the average rate of water flow, in gallons per minute?
 - (A) 8.458 (B) 13.395
- (C) 14.691
- (D) 18.916
- (E) 35.833

х	f(x)	f'(x)	g (x)	g'(x)
1	3	-2	-3	4

- 14. The table above gives values of the differentiable functions f and g and their derivatives at x = 1. If h(x) = (2f(x)+3)(1+g(x)), then h'(1) =
 - (A) -28
- (B) -16
- (C) 40
- (D) 44
- (E) 47
- 15. The functions f and g are differentiable, and f(g(x)) = x for all x. If f(3) = 8 and f'(3) = 9, what are the values of g(8) and g'(8)?
 - (A) $g(8) = \frac{1}{3}$ and $g'(8) = -\frac{1}{9}$ (B) $g(8) = \frac{1}{3}$ and $g'(8) = \frac{1}{9}$
- (C) g(8) = 3 and g'(8) = -9

- (D) g(8) = 3 and $g'(8) = -\frac{1}{9}$
- (E) g(8) = 3 and $g'(8) = \frac{1}{9}$
- 16. A particle moves along the x-axis so that its velocity at any time t > 0 is given by $v(t) = 5te^{-t} 1$. At t = 0, the particle is at position x = 1. What is the total distance traveled by the particle from t = 0 to t = 4?
 - (A) 0.366
- (B) 0.542
- (C) 1.542
- (D) 1.821
- (E) 2.821
- 17. Let f be the function with first derivative defined by $f'(x) = \sin(x^3)$ for $0 \le x \le 2$. At what value of x does f attain its maximum value on the closed interval $0 \le x \le 2$.
 - (A) 0
- (B) 1.162
- (C) 1.465
- (D) 1.845
- (E) 2