Section I—Part B

Number of Questions	Time	Use of Calculator
17	50 Minutes	Yes

Directions:

Use the same answer sheet for Part A. *Please note that the questions begin with number 76.* This is not an error. It is done to be consistent with the numbering system of the actual AP Calculus AB Exam. All questions are given equal weight. There is no penalty for unanswered questions. Unless otherwise indicated, the domain of a function f is the set of all real numbers. If the exact numerical value does not appear among the given choices, select the best approximate value. The use of a calculator is *permitted* in this part of the exam.

76. If $f(x) = \int_0^x -\cos t\, dt$ on $[0, 2\pi]$, then f has a local maximum at $x =$

(A) 0 (B) $\frac{\pi}{2}$ (C) π
(D) $\frac{3\pi}{2}$ (E) 2π

77. The equation of the normal line to the graph $y = e^{2x}$ at the point where $\frac{dy}{dx} = 2$ is

(A) $y = -\frac{1}{2}x - 1$

(B) $y = -\frac{1}{2}x + 1$

(C) $y = 2x + 1$

(D) $y = -\frac{1}{2}\left(x - \frac{\ln 2}{2}\right) + 2$

(E) $y = 2\left(x - \frac{\ln 2}{2}\right) + 2$

78. The graph of f', the derivative of f, is shown in Figure 1T-8. At which value of x does the graph of f have a point of inflection?

(A) 0 (B) x_1 (C) x_2
(D) x_3 (E) x_4

79. The temperature of a metal is dropping at the rate of $g(t) = 10e^{-0.1t}$ for $0 \le t \le 10$, where g is measured in degrees in Fahrenheit and t in minutes. If the metal is initally 100°F, what is the temperature to the nearest degree Fahrenheit after 6 minutes?

(A) 37 (B) 45 (C) 55
(D) 63 (E) 82

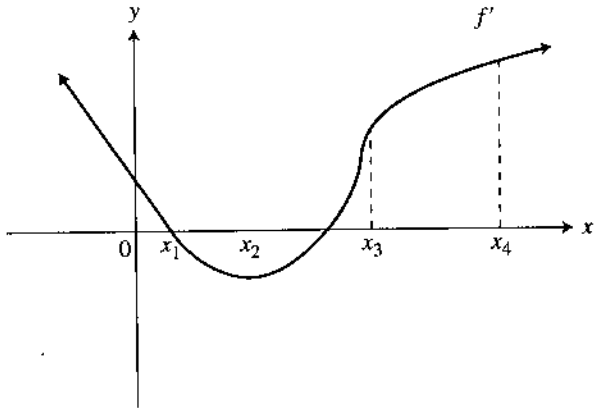

Figure 1T-8

80. What is the approximate volume of the solid obtained by revolving the region in the first quadrant enclosed by the curves $y = x^3$ and $y = \sin x$ about the x-axis?

(A) 0.061π (B) 0.139π (C) 0.215π
(D) 0.225π (E) 0.278π

81. Let f be a differentiable function on (a, b). If f has a point of inflection on (a, b), which of the following could be the graph of f'' on (a, b)? (See Figure 1T-9.)

(A) A (B) B (C) C (D) D (E) None

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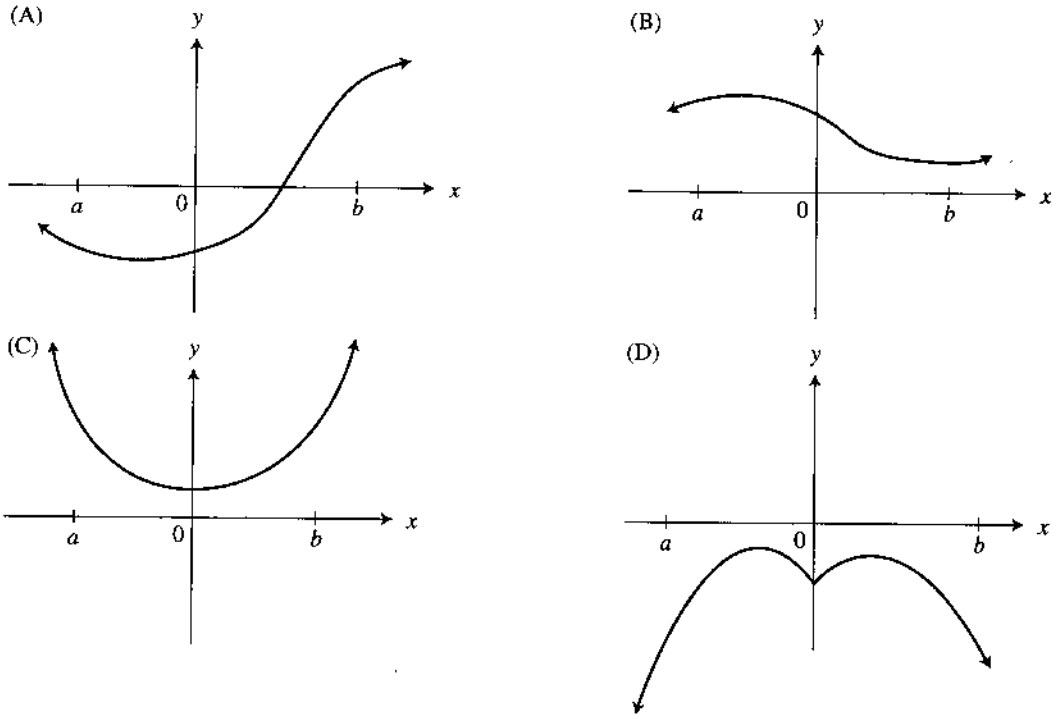

Figure 1T-9

82. The base of a solid is a region bounded by the lines $y = x$, $y = -x$, and $x = 4$ as shown in Figure 1T-10. What is the volume of the solid if the cross sections perpendicular to the x-axis are equilateral triangles?

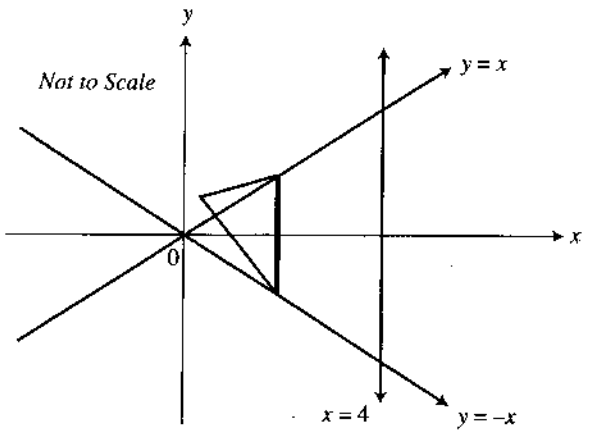

Figure 1T-10

(A) $\frac{16\sqrt{3}}{3}$ (B) $\frac{32\sqrt{3}}{3}$ (C) $\frac{64\sqrt{3}}{3}$
(D) $\frac{256\pi}{3}$ (E) $\frac{3072\pi}{5}$

83. Let f be a continuous function on [0, 6] and have selected values as shown below.

x	0	2	4	6
$f(x)$	0	1	2.25	6.25

If you use the subintervals [0, 2], [2, 4], and [4, 6], what is the trapezoidal approximation of $\int_0^6 f(x)dx$?

(A) 9.5 (B) 12.75 (C) 19
(D) 25.5 (E) 38.25

84. The amount of a certain bacteria y in a petri dish grows according to the equation $\frac{dy}{dt} = ky$, where k is a constant and t is measured in hours.

If the amount of bacteria triples in 10 hours, then $k \approx$

(A) -1.204 (B) -0.110 (C) 0.110
(D) 1.204 (E) 0.3

85. The volume of the solid generated by revolving the region bounded by the graphs of $y = \sqrt{x}$ and $y = x$ about the y-axis is

(A) $\frac{2\pi}{15}$ (B) $\frac{\pi}{6}$ (C) $\frac{2\pi}{3}$
(D) $\frac{16\pi}{15}$ (E) $\frac{56\pi}{15}$

86. How many points of inflection does the graph of $y = \frac{\sin x}{x}$ have on the interval $(-\pi, \pi)$?

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

87. Given $f(x) = x^2 e^x$, what is an approximate value of $f(1.1)$, if you use a tangent line to the graph of f at $x = 1$?

(A) 3.534 (B) 3.635 (C) 7.055
(D) 8.155 (E) 10.244

88. The area under the curve $y = \sin x$ from $x = b$ to $x = \pi$ is 0.2. If $0 \leq b < \pi$, then $b =$

(A) -0.927 (B) -0.201 (C) 0.644
(D) 1.369 (E) 2.498

89. At what value(s) of x do the graphs of $y = x^2$ and $y = -\sqrt{x}$ have perpendicular tangent lines?

(A) -1 (B) 0 (C) $\frac{1}{4}$
(D) 1 (E) None

90. What is the approximate slope of the tangent to the curve $x^3 + y^3 = xy$ at $x = 1$?

(A) -2.420 (B) -1.325 (C) -1.014
(D) -0.698 (E) 0.267

91. The graph of f is shown in Figure 1T-11, and $g(x) = \int_a^x f(t)dt$, $x > a$. Which of the following is a possible graph of g? (See Figure 1T-12.)

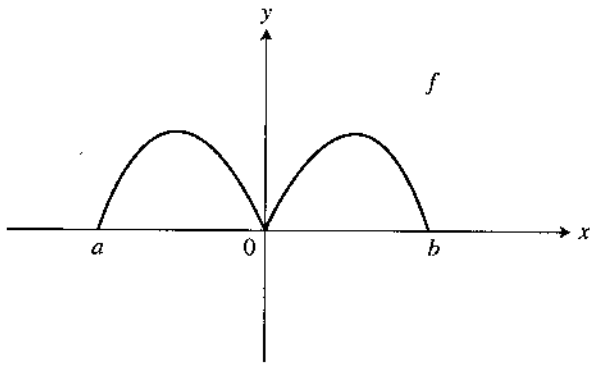

Figure 1T-11

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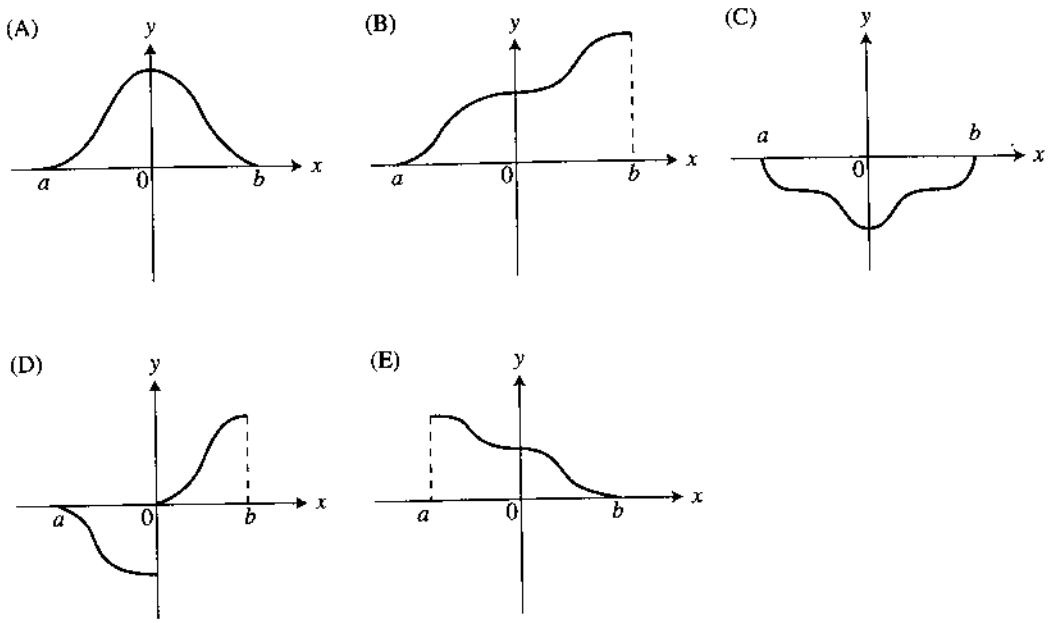

Figure 1T-12

92. If $g(x) = |xe^x|$, which of the following statements about g are true?

I. g has a relative minimum at $x = 0$.
II. g changes concavity at $x = 0$.
III. g is differentiable at $x = 0$.

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) I and III only

STOP. AP Calculus AB Practice Exam 1 Section I—Part B