

Part B consists of 17 questions that will be answered on side 2 of the answer sheet. Following are the directions for Section I, Part B)

A GRAPHING CALCULATOR IS REQUIRED FOR SOME QUESTIONS ON THIS PART OF THE EXAMINATION

Directions: Solve each of the following problems, using the available space for scratchwork. After examining the form of the choices, decide which is the best of the choices given and fill in the corresponding oval on the answer sheet. No credit will be given for anything written in the test book. Do not spend too much time on any one problem.

BE SURE YOU ARE USING SIDE 2 OF THE ANSWER SHEET TO RECORD YOUR ANSWERS TO QUESTIONS NUMBERED 29–45.

YOU MAY NOT RETURN TO SIDE 1 OF THE ANSWER SHEET.

In this test:

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.
29. The graph of $y = 5x^4 - x^5$ has an inflection point (or points) at
- (A) $x = 0$ only
 - (B) $x = 3$ only
 - (C) $x = 0, 3$
 - (D) $x = -3$ only
 - (E) $x = 0, -3$

30. The average value of $f(x) = e^{4x^2}$ on the interval $\left[-\frac{1}{4}, \frac{1}{4}\right]$ is

- (A) 0.272
- (B) 0.545
- (C) 1.090
- (D) 2.180
- (E) 4.360

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31. $\int_0^1 \tan x \, dx =$

- (A) 0
 - (B) $\frac{\tan^2 1}{2}$
 - (C) $\ln(\cos(1))$
 - (D) $\ln(\sec(1))$
 - (E) $\ln(\sec(1)) - 1$
-

32. $\frac{d}{dx} \int_0^{x^2} \sin^2 t \, dt =$

- (A) $x^2 \sin^2(x^2)$
 - (B) $2x \sin^2(x^2)$
 - (C) $\sin^2(x^2)$
 - (D) $x^2 \cos^2(x^2)$
 - (E) $2x \cos^2(x^2)$
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33. Find the value(s) of $\frac{dy}{dx}$ of $x^2y + y^2 = 5$ at $y = 1$.

- (A) $-\frac{3}{2}$ only (B) $-\frac{2}{3}$ only (C) $\frac{2}{3}$ only (D) $\pm\frac{2}{3}$ (E) $\pm\frac{3}{2}$
-

34. The graph of $y = x^3 - 2x^2 - 5x + 2$ has a local maximum at

- (A) (2.120, 0)
(B) (2.120, -8.061)
(C) (-0.786, 0)
(D) (-0.786, 4.209)
(E) (0.666, -1.926)
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35. Approximate $\int_0^1 \sin^2 x \, dx$ using the trapezoid rule with $n = 4$, to three decimal places.

- (A) 0.277
(B) 0.273
(C) 0.555
(D) 1.109
(E) 2.219
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36. The volume generated by revolving about the x -axis the region above the curve $y = x^3$, below the line $y = 1$, and between $x = 0$ and $x = 1$ is

(A) $\frac{\pi}{42}$

(B) 0.143π

(C) $\frac{\pi}{7}$

(D) 0.643π

(E) $\frac{6\pi}{7}$

37. A 20 foot ladder slides down a wall at 5 ft/sec. At what speed is the bottom sliding out when the top is 10 feet from the floor? (in ft/sec).

(A) 0.346

(B) 2.887

(C) 0.224

(D) 5.774

(E) 4.472

38. $\int \frac{\ln x}{3x} dx =$

(A) $6\ln^2|x| + C$

(B) $\frac{1}{6}\ln(\ln|x|) + C$

(C) $\frac{1}{3}\ln^2|x| + C$

(D) $\frac{1}{6}\ln^2|x| + C$

(E) $\frac{1}{3}\ln|x| + C$

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39. Find two nonnegative numbers x and y whose sum is 100 and for which xy^2 is a maximum.

- (A) $x = 33.333$ and $y = 33.333$
 - (B) $x = 50$ and $y = 50$
 - (C) $x = 33.333$ and $y = 66.667$
 - (D) $x = 100$ and $y = 0$
 - (E) $x = 66.667$ and $y = 33.333$
-

40. Find the distance traveled (to three decimal places) from $t = 1$ to $t = 5$ seconds, for a particle whose velocity is given by $v(t) = t + \ln t$.

- (A) 6.000
 - (B) 1.609
 - (C) 16.047
 - (D) 0.800
 - (E) 148.413
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41. $\int \sin^5(2x)\cos(2x) dx =$


- (A) $\frac{\sin^6 2x}{12} + C$
(B) $\frac{\sin^6 2x}{6} + C$
(C) $\frac{\sin^6 2x}{3} + C$
(D) $\frac{\cos^5 2x}{3} + C$
(E) $\frac{\cos^5 2x}{6} + C$
-

42. The volume of a cube is increasing at a rate proportional to its volume at any time t . If the volume is 8 ft^3 originally, and 12 ft^3 after 5 seconds, what is its volume at $t = 12$ seconds?

- (A) 21.169
(B) 22.941
(C) 16.000
(D) 28.800
(E) 17.600
-

43. If $f(x) = \left(1 + \frac{x}{20}\right)^5$, find $f''(40)$.

- (A) 0.068
(B) 1.350
(C) 5.400
(D) 6.750
(E) 540.000
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44. A particle's height at a time $t \geq 0$ is given by $h(t) = 100t - 16t^2$. What is its maximum height?
- (A) 312.500 (B) 156.250 (C) 78.125 (D) 6.250 (E) 3.125
-

45. If $f(x)$ is continuous and differentiable and $f(x) = \begin{cases} ax^4 + 5x; & x \leq 2 \\ bx^2 - 3x; & x > 2 \end{cases}$, then $b =$

- (A) 0.5
(B) 0
(C) 2
(D) 6
(E) There is no value of B
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STOP

END OF SECTION I

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION

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

MAKE SURE YOU HAVE PLACED YOUR AP NUMBER LABEL ON YOUR ANSWER SHEET AND HAVE WRITTEN AND GRIDDED YOUR NUMBER CORRECTLY IN SECTION C OF THE ANSWER SHEET