

1. What is the area enclosed by the curves $y = x^3 - 8x^2 + 18x - 5$ and $y = x + 5$?

(Calculator)

- (A) 10.667
 (B) 11.833
 (C) 14.583
 (D) 21.333
 (E) 32

2. What is the average value of $y = \frac{\cos x}{x^2 + x + 2}$ on the closed interval $[-1, 3]$? **(Calculator)**

- (A) -0.085
 (B) 0.090
 (C) 0.183
 (D) 0.244
 (E) 0.732

3. The base of a solid is the region in the first quadrant bounded by the y -axis, the graph of $y = \tan^{-1}x$, the horizontal line $y = 3$, and the vertical line $x = 1$. For this solid, each cross section perpendicular to the x -axis is a square. What is the volume of the solid? **(Calculator)**

- (A) 2.561
 (B) 6.612
 (C) 8.046
 (D) 8.755
 (E) 20.773

4. If $0 \leq k < \frac{\pi}{2}$ and the area under the curve $y = \cos x$ from $x = k$ to $x = \frac{\pi}{2}$ is 0.1, then

$k =$

(Calculator)

- (A) 1.471
 (B) 1.414
 (C) 1.277
 (D) 1.120
 (E) 0.436

5. If the region enclosed by the y -axis, the line $y = 2$, and the curve $y = \sqrt{x}$ is revolved about the y -axis, the volume of the solid generated is **(Non-Calculator)**

- (A) $\frac{32\pi}{5}$
 (B) $\frac{16\pi}{3}$
 (C) $\frac{16\pi}{5}$
 (D) $\frac{8\pi}{3}$
 (E) π

6. The average value of $\cos x$ on the interval $[-3, 5]$ is **(Non-Calculator)**

- (A) $\frac{\sin 5 - \sin 3}{8}$
 (B) $\frac{\sin 5 - \sin 3}{2}$
 (C) $\frac{\sin 3 - \sin 5}{2}$
 (D) $\frac{\sin 3 + \sin 5}{2}$
 (E) $\frac{\sin 3 + \sin 5}{8}$

7. What is the area of the region in the first quadrant enclosed by the graphs of $y = \cos x$, $y = x$, and the y -axis? **(Calculator)**

- (A) 0.127
 (B) 0.385
 (C) 0.400
 (D) 0.600
 (E) 0.947

8. The base of a solid S is the region enclosed by the graph of $y = \sqrt{\ln x}$, the line $x = e$, and the x -axis. If the cross sections of S perpendicular to the x -axis are squares, then the volume of S is **(Calculator)**

- (A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) 1 (D) 2 (E) $\frac{1}{3}(e^3 - 1)$

9. The area of the region enclosed by the curve $y = \frac{1}{x-1}$, the x -axis, and the lines $x = 3$ and $x = 4$ is **(Non-Calculator)**

- (A) $\frac{5}{36}$
 (B) $\ln \frac{2}{3}$
 (C) $\ln \frac{4}{3}$
 (D) $\ln \frac{3}{2}$
 (E) $\ln 6$

10. The region enclosed by the x -axis, the line $x = 3$, and the curve $y = \sqrt{x}$ is rotated about the x -axis. What is the volume of the solid generated? **(Non-Calculator)**

- (A) 3π
 (B) $2\sqrt{3}\pi$
 (C) $\frac{9}{2}\pi$
 (D) 9π
 (E) $\frac{36\sqrt{3}}{5}\pi$

11. What is the average value of y for the part of the curve $y = 3x - x^2$ which is in the first quadrant? **(Non-Calculator)**

- (A) -6
 (B) -2
 (C) $\frac{3}{2}$
 (D) $\frac{9}{4}$
 (E) $\frac{4}{9}$

12. The volume of the solid obtained by revolving the region enclosed by the ellipse $x^2 + 9y^2 = 9$ about the x -axis is **(Non-Calculator)**

- (A) 2π
 (B) 4π
 (C) 6π
 (D) 9π
 (E) 12π

13. The area of the region in the first quadrant that is enclosed by the graphs of $y = x^3 + 8$ and $y = x + 8$ is **(Non-Calculator)**

- (A) $\frac{1}{4}$
 (B) $\frac{1}{2}$
 (C) $\frac{3}{4}$
 (D) 1
 (E) $\frac{65}{4}$

14. The average value of $f(x) = x^2\sqrt{x^3 + 1}$ on the closed interval $[0,2]$ is **(Non-Calculator)**

- (A) $\frac{26}{9}$
 (B) $\frac{13}{3}$
 (C) $\frac{26}{3}$
 (D) 13
 (E) 26

15. The area of the region bounded by the lines $x = 0$, $x = 2$, and $y = 0$ and the curve $y = e^{\frac{x}{2}}$ is **(Calculator)**

- (A) $\frac{e-1}{2}$
 (B) $e-1$
 (C) $2(e-1)$
 (D) $2e-1$
 (E) $2e$

16. The area of the region enclosed by the graphs of $y = x$ and $y = x^2 - 3x + 3$ is **(Calculator)**

- (A) $\frac{2}{3}$
 (B) 1
 (C) $\frac{4}{3}$
 (D) 2
 (E) $\frac{14}{3}$

Answers:

1.B 2.C 3.B 4.D 5.A 6.E 7.C 8.C 9.D 10.C 11.C 12.B 13.A 14.A 15.C 16.C