1. On $[2,4]$, $\lim_{n\to\infty} \frac{2}{n} \sum_{i=1}^{n} \frac{1}{2+\frac{2i}{n}} =$

   (a) $\ln 2$

   (b) $\frac{\ln 2}{2}$

   (c) $\frac{1}{4}$

   (d) $\frac{1}{6}$

   (e) $\frac{1}{2\ln 2}$

2. Let $\int_1^{x^2} \frac{2f(\sqrt{t})}{t^2}\,dt = x^2 - 1$. If $x > 0$, then $f'(2) =$

   (a) 20

   (b) 16

   (c) 22

   (d) 18

   (e) 24

3. $\int_0^1 (1+x)\sqrt{1-x}\,dx =$

(a) $\frac{4}{3}$

(b) $\frac{3}{5}$

(c) $\frac{14}{15}$

(d) 1

(e) $\frac{8}{15}$

4. The area of the region enclosed by the curve $y^2 = -x$ and the line $x + y + 2 = 0$ is equal to

(a) 2

(b) 3

(c) $\frac{10}{2}$

(d) $\frac{9}{2}$

(e) $\frac{3}{2}$

5. The volume of the solid generated by rotating the region bounded by the curves $y = x^2$ and $x = y^2$ about the line $x = 2$ is given by

(a) $\pi \int_0^2 (x - x^4)\, dx$

(b) $\pi \int_0^1 (y^2 - y^4)\, dy$

(c) $\pi \int_0^1 (2 - x)(\sqrt{x} - x^2)\, dx$

(d) $\pi \int_0^1 (\sqrt{y} + y + y^2 + y^4)\, dy$

(e) $\pi \int_0^1 (2\sqrt{y} - y - 2y^2 + y^4)\, dy$

6. Let f be an **odd** and continuous function.
If $\int_0^4 f(x)\, dx = 6$, then $\int_0^2 f(-2x)\, dx =$

(a) -3

(b) -6

(c) -12

(d) 12

(e) 6

7. The position function of a particle moving in a straight line is given by

$$s(t) = \frac{t^3}{3} - \frac{t^2}{2}, \quad t \geq 0$$

The **total distance** traveled by the particle over the time interval $0 \leq t \leq 2$ is

(a) 3

(b) 1

(c) $\frac{1}{3}$

(d) $\frac{5}{3}$

(e) 5

8. $\displaystyle\int_0^{1/2} \frac{e^{\sin^{-1} x}}{\sqrt{1-x^2}}\, dx =$

(a) $e^{\pi/4} - 1$

(b) $e^{\pi/3} + 1$

(c) $e^{\pi/6} - 1$

(d) $e^{\pi/4} + 1$

(e) $2e - 1$

9. The volume of the solid generated by revolving the region bounded by the curves of $y = x^2 + 1$ and $y = x + 3$ about the x-axis is given by

(a) $\pi \int_{-1}^{1} (8 + 6x + 3x^2 - x^4)\, dx$

(b) $\pi \int_{-1}^{2} (8 - 6x + x^2 - x^4)\, dx$

(c) $\pi \int_{-1}^{1} (8 - 6x - 3x^2 - x^4)\, dx$

(d) $\pi \int_{-1}^{2} (8 + 6x - x^2 - x^4)\, dx$

(e) $\pi \int_{0}^{2} (8 + 6x - 2x^2 + x^4)\, dx$

10. The base of a solid is bounded by the curves $y = x^2, y = 0$ and $x = 1$. If the cross-sections perpendicular to the x-axis are semi-circles, then the volume of the solid is

(a) $\frac{\pi}{6}$

(b) $\frac{1}{5}$

(c) $\frac{1}{10}$

(d) $\frac{\pi}{5}$

(e) $\frac{\pi}{40}$