Question 1:

$$\frac{d}{dx}\left[\int_{\sqrt{x}}^{2}\cos\left(t^2\right)dt\right]=$$

(a) $\dfrac{\cos x}{\sqrt{x}}$

(b) $\cos 4-\cos x$

(c) $\sin 4-\sin x$

(d) $\dfrac{\sin 4}{4}-\dfrac{\sin x}{2\sqrt{x}}$

(e) $-\dfrac{\cos x}{2\sqrt{x}}$

Question 2:

$$\lim_{n\to+\infty}\frac{1}{n}\left(\sqrt[3]{\frac{1}{n}}+\sqrt[3]{\frac{2}{n}}+\sqrt[3]{\frac{3}{n}}+\ldots+\sqrt[3]{\frac{n}{n}}\right)=$$

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

(b) 0

(c) $\sqrt[3]{4}$

(d) 1

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

Question 3:

The area of the region bounded by the curves $y^2 - x = 4$ and $y^2 + x = 2$ is equal to

(a) 4

(b) 6

(c) $4\sqrt{3}$

(d) $8\sqrt{3}$

(e) 3

Question 4:

$$\int_1^4 \frac{e^{\sqrt{x}} \cos\left(e^{\sqrt{x}}\right)}{\sqrt{x}} dx =$$

(a) $4\cos e$

(b) $2\left(\cos e - \cos e^2\right)$

(c) $2\left(\sin e^2 - \sin e\right)$

(d) $\frac{1}{2}\left(\cos e - \cos e^2\right)$

(e) $4\sin e$

Question 5:

The volume of the solid obtained by rotating the region bounded by the curves $y = x^3$, $y = 1$, and $x = 0$ about the y-axis is equal to

(a) $\frac{3\pi}{7}$

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

(c) $\frac{3\pi}{4}$

(d) $\frac{2\pi}{3}$

(e) $\frac{3\pi}{5}$

Question 6:

A particle moves along a line so that its velocity at time t is $v(t) = \sin t$ (measured in meters per second). The distance traveled by the particle during the time period $0 \le t \le \frac{3\pi}{2}$ is equal to

(a) 3 meters

(b) 2 meters

(c) 1 meters

(d) $\frac{3}{2}$ meters

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

Question 7:

The volume of the solid generated by revolving the region bounded by the parabolas $y = x^2$ and $y^2 = 8x$ about the line $y = -1$ is given by

(a) $\pi \int_0^2 \left(8x - x^4\right)\, dx$

(b) $\pi \int_0^2 \left[\left(\sqrt{8x}+1\right)^2 - \left(x^2+1\right)^2\right] dx$

(c) $\pi \int_0^{16} \left[\left(\sqrt{y}+1\right)^2 - \left(\frac{1}{8}y^2+1\right)^2\right] dy$

(d) $\pi \int_0^{16} \left[\left(\sqrt{y}-1\right)^2 - \left(\frac{1}{8}y^2-1\right)^2\right] dy$

(e) $\pi \int_0^2 \left(\sqrt{8x} - x^2\right)^2 dx$

Question 8:

A solid has a base lying in the first quadrant and is bounded by the curves $y = 1 - \frac{1}{4}x^2$, $x = 0$, and $y = 0$. If the cross sections of the solid perpendicular to the x-axis are squares, then the volume of the solid is equal to

(a) $\frac{16}{15}$

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

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

(d) $\frac{11}{15}$

(e) $\frac{17}{15}$

Question 9: (Bonus)

If f is continuous on $[0,1]$ and $\int_0^1 f(x)\,dx = 2$, then $\int_0^1 f(1-x)\,dx =$

(a) -2

(b) 1

(c) 0

(d) -1

(e) 2