

1. The volume of the solid obtained by rotating about the y -axis the region bounded by: $y = \frac{1}{x}$, $y = 0$, $x = 1$ and $x = 2$ is equal to

- (a) 3π
- (b) 2π
- (c) $\pi/3$
- (d) π
- (e) $2\pi \ln 2$

2. The volume of the solid obtained by rotating the region bounded by $y = 1 - x^2$ and $y = 0$, about $y = -1$ is equal to

- (a) $43\pi/5$
- (b) $28\pi/15$
- (c) $56\pi/15$
- (d) $86\pi/5$
- (e) $12\pi/5$

3. The volume generated by rotating the region bounded by $y = \ln x$, $y = 0$, and $x = e$ about the y -axis is equal to

- (a) πe
- (b) $\pi e(e - 1)$
- (c) π
- (d) $\pi e - \pi + 1$
- (e) $\frac{\pi}{2}(e^2 + 1)$

4. The integral $\int \frac{e^{2x}}{1+e^{4x}} dx$ is equal to

- (a) $\frac{1}{2} \tan^{-1}(e^{4x}) + C$
- (b) $\frac{1}{4} \ln(1 + e^{4x}) + C$
- (c) $\ln(1 + e^{4x}) + \sin^{-1} e^{2x} + C$
- (d) $\frac{1}{2} \tan^{-1}(e^{2x}) + C$
- (e) $\tan^{-1} e^x + C$

5. The integral $\int_{2\pi/3}^{3\pi/2} \frac{\sin x dx}{1+\cos x}$

- (a) converges to 1
- (b) converges to $\ln 0.5$
- (c) diverges
- (d) converges to $\ln 2$
- (e) converges to 0

6. The integral $\int \frac{dx}{x^3 + x}$ is equal to

- (a) $\ln |x| - \frac{1}{2}(x^2 + 1) + C$
- (b) $\ln |x^3 + x| + C$
- (c) $-\frac{1}{4}x^{-4} - \frac{1}{2}x^2 + \tan^{-1} x^2 + C$
- (d) $\ln |x| - \frac{1}{2} \ln(x^2 + 1) + C$
- (e) $\ln |x| + \frac{1}{2} \ln(x^2 + 1) + \frac{1}{(x^3 + x)^2} + C$

7. The integral $\int_0^{\pi/2} \sin^6 x \cos^3 x \, dx$ is equal to

- (a) 18
- (b) $1/28$
- (c) $2/63$
- (d) $1/63$
- (e) $3/28$

8. The average value of $\frac{(\tan^{-1} x)^2}{1+x^2}$ on $[0, 1]$ is equal to

- (a) $\pi^3/192$
- (b) $3\pi^2/25$
- (c) $3\pi^2/16$
- (d) $3\pi^2/4$
- (e) $\pi^3/25$

9. The integral $\int \tan^2 x \sec x \, dx$ is equal to

- (a) $\frac{1}{3} \tan^3 x + C$
- (b) $\frac{1}{2} \sec^2 x \tan^3 x - \ln |\sec^2 x + \tan^3 x| + C$
- (c) $\frac{1}{3} \sec^3 x + C$
- (d) $\frac{1}{2} (\sec x \tan x - \ln |\sec x + \tan x|) + C$
- (e) $\frac{1}{2} (\sec^2 x \tan^3 x + \ln |\sec^2 x + \tan^3 x|) + C$

10. The integral $\int \sqrt{\frac{1-x}{1+x}} dx$ is equal to

- (a) $\tan^{-1} x + \sqrt{1-x^2} + C$
- (b) $\ln \sqrt{1-x^2} - \frac{1}{2} \sin^{-1} \sqrt{1-x^2} + C$
- (c) $\ln \sqrt{1-x^2} - \sin^{-1} \sqrt{1-x^2} + C$
- (d) $\ln |1-x^2| + \sin^{-1} x + C$
- (e) $\sin^{-1} x + \sqrt{1-x^2} + C$

11. The integral $\int_1^e \sin(\ln x) dx$ is equal to

- (a) $\frac{1}{2} (1 + e \sin 1 - e \cos 1)$
- (b) $\frac{1}{2} (1 + \sin 1 - \cos 1)$
- (c) $1 + e \sin 1 - e \cos 1$
- (d) $\frac{1}{2} (e \sin 1 - e \cos 1)$
- (e) $\frac{1}{2} (1 + e \sin 1 + e \cos 1)$

12. The integral $\int \frac{dx}{\sqrt{x} + \sqrt[4]{x}}$ is equal to

- (a) $2 \sqrt{x} + 4 \sqrt[4]{x} + 4 \ln(\sqrt[4]{x} + 1) \sin^{-1} \sqrt[4]{x} + C$
- (b) $2 \sqrt{x} + 4 \ln(\sqrt[4]{x} + 1) + \frac{1}{(\sqrt{x} + \sqrt[4]{x})^2} + C$
- (c) $2 \sqrt{x} - 4 \sqrt[4]{x} + 4 \ln(\sqrt[4]{x} + 1) + C$
- (d) $2x^2 - 4x + 4 \ln|x + 1| - \tan^{-1} \sqrt[4]{x} + C$
- (e) $\ln|\sqrt{x} + \sqrt[4]{x}| + C$

13. The integral $\int_{-\infty}^0 xe^{-x^2} dx$

- (a) converges to 1
- (b) converges to $-1/2$
- (c) converges to -1
- (d) diverges
- (e) converges to 0

14. The volume of the solid obtained by rotating about the x -axis the region bounded by: $x = 4y^2 - y^3$ and $x = 0$ is equal to

- (a) $512\pi/5$
- (b) $64\pi/3$
- (c) $256\pi/5$
- (d) $128\pi/3$
- (e) $64\pi/5$

15. The integral $\int x\sqrt{1-x^4}dx$ is equal to

- (a) $\frac{-2x^5}{\sqrt{1-x^4}} \sin^{-1}(x) + \frac{1}{4}x^2\sqrt{1-x^4} + C$
- (b) $\frac{1}{2} \sin^{-1}(x) + \frac{1}{4}x\sqrt{1-x^4} + C$
- (c) $\frac{1}{4}x^2 + \frac{1}{8}x^2 \sin 2x^2 + C$
- (d) $\frac{1}{2} \tan^{-1}(x^2) + \frac{3}{4}x\sqrt{1-x^4} + C$
- (e) $\frac{1}{4} \sin^{-1}(x^2) + \frac{1}{4}x^2\sqrt{1-x^4} + C$