

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 revolving 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 revolving 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) $\frac{2}{63}$
- (d) 1/63
- (e) 3/28

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

- (a) $\frac{\pi^3}{192}$
- (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. An evaluation of $\int \sqrt{\frac{1-x}{1+x}} dx$ is

- (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) $\ln|1 - x^2| + \sin^{-1}\sqrt{1 - x^2} + C$
 (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. An evaluation of the integral $\int x\sqrt{1 - x^4} dx$ is

(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) $\frac{1}{4} \sin^{-1}(x^2) + \frac{1}{4}x^2\sqrt{1-x^4} + C$