

Calculus I

Section 5.3C – Integration Review

Evaluate the following integrals.

1. $\int \frac{1}{x^6} dx$

2. $\int \sqrt[3]{x^2} dx$

3. $\int \left(x^{2/3} - 4x^{-1/5} + 4 \right) dx$

4. $\int (1+x^2)(2-x) dx$

5. $\int \left(\frac{1}{t^2} - \cos t \right) dt$

6. $\int \sqrt{\theta} - \csc^2 \theta d\theta$

7. $\int \frac{\sin 2x}{\cos x} dx$

8. $\int \varphi + \frac{2}{\sin^2 \varphi} d\varphi$

9. $\int \frac{x^5 + 2x^2 - 1}{x^4} dx$

10. $\int (3x-1)^5 dx$

11. $\int \sin 10x dx$

12. $\int \sec^2 5x dx$

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$$13. \int \sqrt{3t+1} dt$$

$$14. \int \frac{x}{\sqrt{4-5x^2}} dx$$

$$15. \int \frac{1}{(1-3x)^2} dx$$

$$16. \int x \cos 3x^2 dx$$

$$17. \int \frac{\sec^2 \sqrt{x}}{\sqrt{x}} dx$$

$$18. \int \cos^3 2t \sin 2t dt$$

$$19. \int \frac{\sin 2\theta}{(5 + \cos 2\theta)^3} d\theta$$

$$20. \int x \sqrt{2+x} dx$$

$$21. \int x^2 \sqrt{x} dx$$

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Section 5.3C – Integration Review

Evaluate the following integrals.

1. $\int \frac{1}{x^6} dx$

$$\int x^{-6} dx$$

$$\boxed{-\frac{1}{5}x^{-5} + C}$$

2. $\int \sqrt[3]{x^2} dx$

$$\int x^{2/3} dx$$

$$\boxed{\frac{3}{5}x^{5/3} + C}$$

3. $\int (x^{2/3} - 4x^{-1/5} + 4) dx$

$$\int x^{2/3} - 4x^{-1/5} + 4 dx$$

$$\boxed{\frac{3}{5}x^{5/3} - 5x^{4/5} + 4x + C}$$

4. $\int (1+x^2)(2-x) dx$

$$\int -x^3 + 2x^2 - x + 2 dx$$

$$\boxed{-\frac{1}{4}x^4 + \frac{2}{3}x^3 - \frac{1}{2}x^2 + 2x + C}$$

5. $\int \left(\frac{1}{t^2} - \cos t \right) dt$

$$\int t^{-2} - \cos t dt$$

$$\boxed{-t^{-1} - \sin t + C}$$

6. $\int \sqrt{\theta} - \csc^2 \theta d\theta$

$$\int \theta^{1/2} - \csc^2 \theta d\theta$$

$$\boxed{\frac{2}{3}\theta^{3/2} + \cot \theta + C}$$

7. $\int \frac{\sin 2x}{\cos x} dx$

$$\int \frac{2 \sin \theta \cos \theta}{\cos \theta} d\theta$$

$$\boxed{-2 \cos x + C}$$

8. $\int \phi + \frac{2}{\sin^2 \phi} d\phi$

$$\int \phi + 2 \csc^2 \phi d\phi$$

$$\boxed{\frac{1}{2}\phi^2 - 2 \cot \phi + C}$$

9. $\int \frac{x^5 + 2x^2 - 1}{x^4} dx$

$$\int x + 2x^{-2} - x^{-4} dx$$

$$\boxed{\frac{1}{2}x^2 - 2x^{-1} + \frac{1}{3}x^{-3} + C}$$

10. $\int (3x-1)^5 dx$

$$u = 3x-1$$

$$du = 3 dx$$

$$\frac{1}{3} \int u^5 du$$

$$\boxed{\frac{1}{18}(3x-1)^6 + C}$$

11. $\int \sin 10x dx$

$$u = 10x$$

$$du = 10 dx$$

$$\frac{1}{10} \int \sin u du$$

$$\boxed{-\frac{1}{10} \cos 10x + C}$$

12. $\int \sec^2 5x dx$

$$u = 5x$$

$$du = 5 dx$$

$$\frac{1}{5} \int \sec^2 u du$$

$$\boxed{\frac{1}{5} \tan 5x + C}$$

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13. $\int \sqrt{3t+1} dt$

$u = 3t+1$
 $du = 3dt$

$\frac{1}{3} \int u^{1/2} du$

$\frac{2}{9} u^{3/2} + C$

$\frac{2}{9} (3t+1)^{3/2} + C$

14. $\int \frac{x}{\sqrt{4-5x^2}} dx$

$u = 4-5x^2$
 $du = -10x dx$

$-\frac{1}{10} \int u^{-1/2} du$

$-\frac{1}{5} u^{1/2} + C$

$-\frac{1}{5} (4-5x^2)^{1/2} + C$

15. $\int \frac{1}{(1-3x)^2} dx$ $u = 1-3x$
 $du = -3dx$

$-\frac{1}{3} \int u^{-2} du$

$\frac{1}{3} u^{-1} + C$

$\frac{1}{3} (1-3x)^{-1} + C$

16. $\int x \cos 3x^2 dx$

$u = 3x^2$
 $du = 6x dx$

$\frac{1}{6} \int \cos u du$

$\frac{1}{6} \sin 3x^2 + C$

17. $\int \frac{\sec^2 \sqrt{x}}{\sqrt{x}} dx$ $u = x^{1/2}$
 $du = \frac{1}{2} x^{-1/2} dx$

$2 \int \sec^2 u du$

$2 \tan u + C$

$2 \tan \sqrt{x} + C$

18. $\int \cos^3 2t \sin 2t dt$ $u = \cos 2t$
 $du = -2 \sin 2t dt$

$-\frac{1}{2} \int u^3 du$

$-\frac{1}{8} u^4 + C$

$-\frac{1}{8} \cos^4 2t + C$

19. $\int \frac{\sin 2\theta}{(5 + \cos 2\theta)^3} d\theta$

$u = 5 + \cos 2\theta$
 $du = -2 \sin 2\theta d\theta$

$-\frac{1}{2} \int u^{-3} du$

$\frac{1}{4} u^{-2} + C$

$\frac{1}{4} (5 + \cos 2\theta)^{-2} + C$

20. $\int x \sqrt{2+x} dx$ $u = x+2$
 $du = dx$

$\int (u-2) \cdot u^{1/2} du$

$\int u^{3/2} - 2u^{1/2} du$

$\frac{2}{5} u^{5/2} - \frac{4}{3} u^{3/2} + C$

$\frac{2}{5} (x+2)^{5/2} - \frac{4}{3} (x+2)^{3/2} + C$

21. $\int x^2 \sqrt{x} dx$

$\int x^{5/2} dx$

$\frac{2}{7} x^{7/2} + C$