

Integration - Practice Exercises #1 - Answers

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Instructions Do problems 1 - 6 by inspection.

1. $\int \sin(3x) dx = -\frac{1}{3} \cos 3x + C$

2. $\int e^{2x} dx = \frac{1}{2} e^{2x} + C$

3. $\int \sec^2(4x) dx = \frac{1}{4} \tan(4x) + C$

4. $\int \sec(8x) \tan(8x) dx = \frac{1}{8} \sec 8x + C$

5. $\int \cos\left(\frac{9x}{5}\right) dx = \frac{5}{9} \sin \frac{9}{5}x + C$

6. $\int e^{\frac{2}{3}x} dx = \frac{3}{2} e^{\frac{2}{3}x} + C$

For problems 7-10, use u-substitution to solve.

7. $\int (3x^4 + 6x)^{10} (4x^3 + 2) dx = \frac{(3x^4+6x)^{11}}{33} + C$

8. $\int e^{\cos(x)} \sin(x) dx = -e^{\cos(x)} + C$

9. $\int \frac{1}{5x^2+2x} (5x+1) dx = \frac{1}{2} \ln(5x^2+2x) + C$

10. $\int \sec(3x) \tan(3x) dx = \frac{1}{3} \sec 3x + C$

For problems 11 - 15, use integration by parts to solve.

11. $\int x e^{-x} dx = -x e^{-x} - e^{-x} + C$

12. $\int x \cos(5x) dx = \frac{1}{25} \cos 5x + \frac{1}{5} x \sin 5x + C$

13. $\int x^2 \ln(x) dx = \frac{1}{3} x^3 \ln x - \frac{1}{9} x^3 + C$

$$14. \int x \tan^{-1}(x) dx = \frac{1}{2}x^2 \arctan x - \frac{1}{2}x + \frac{1}{2} \arctan x + C$$

$$15. \int e^x \sin(x) dx = -\frac{1}{2}e^x \cos x + \frac{1}{2}e^x \sin x + C$$

For problems 16 - 19, solve by using partial fraction decomposition.

$$16. \int \frac{5x-12}{x(x-4)} dx = 3 \ln x + 2 \ln(x-4) + C$$

$$17. \int \frac{37-11x}{(x+1)(x-2)(x-3)} dx = 4 \ln(x+1) - 5 \ln(x-2) + \ln(x-3) + C$$

$$18. \int \frac{6x-11}{(x-1)^2} dx = \frac{5}{x-1} + 6 \ln(x-1) + C$$

$$19. \int \frac{x^6-x^3+1}{x^4+9x^2} dx = \frac{1}{3}x^3 - 9x - \frac{1}{9x} - \frac{1}{2} \ln(x^2+9) + \frac{728}{27} \arctan \frac{1}{3}x + C$$

Do the rest by any means you can.

$$20. \int \frac{4x}{5x^2+1} dx = \frac{2}{5} \ln(5x^2+1) + C$$

$$21. \int e^{3x^2} 3x dx = \frac{1}{2} e^{3x^2} + C$$

$$22. \int \frac{e^x}{e^x+1} dx = \ln(e^x+1) + C$$