

Topics Covered

- Trigonometry
- Natural Logarithm
- Long Division of Polynomials
- Factoring Polynomials
- Partial Fraction Decomposition
- Derivatives
- Anti-derivatives

Practice Problems

For these problems, assume:

Variables: x, y, z, u, v

Constants: a, b, n

1. $\frac{d}{dx} (x^3 \sin(x))$
2. $\frac{d}{dx} \left(\frac{\ln(x)}{\cos(x)} \right)$
3. $\frac{d}{dx} (\ln(\sin(e^{2x})))$
4. $\frac{d}{dx} (\tan(x))$
5. $\frac{d}{dx} (\sin^2(5x))$
6. $\int e^{ax}$
7. $\int x \sqrt{x^2 + 1}$
8. $\int \frac{\sin(x)}{\cos(x)}$
9. $\int x e^{3x}$
10. $\int x \ln(x)$
11. $\int x^n \ln(x)$
12. $\int \frac{\ln(x)}{x}$
13. $\int \sec^2(x)$
14. $\int \frac{-x^2}{1-x^2}$
15. $\int \sin(ax)$
16. $\int \ln(ax)$
17. $\int \tan(ax)$
18. $\int \sec(ax)$
19. $\int \arctan(ax)$
20. $\int x^5 e^{x^6}$
21. $\int (x^2 + 1)^2 (2x)$
22. $\int \sin^2(3x) \cos(3x)$
23. $\frac{1}{x^2} \cos\left(\frac{1}{x}\right)$
24. $\int x \ln(x + 1)$
25. $\int \frac{(\ln(x))^2}{x}$
26. $\int \arccos(x)$
27. $\int e^{2x} \sin(x)$
28. $\int e^x \sin(x)$
29. $\int \frac{x-3}{x^2-3x+3}$
30. $\int \frac{x^2+2}{(x^2+x+1)(x-1)}$

Appendix A Exercises

Found at the end of Appendix-A in *Fundamentals of Differential Equations* (9th ed).

Tip: For problems 27-34, use trig identities to help you solve the problem.

$$1. \int x^3(1+x^2)^{3/2}$$

$$2. \int 4x^4 e^{6x^5}$$

$$3. \int x \cos(2x)$$

$$4. \int x^3 e^{3x}$$

$$5. \int \cos^2(\pi x)$$

$$6. \int \frac{x^{1/3}}{x^{1/3} + 1}$$

$$7. \int \frac{x+1}{x^2+4}$$

$$8. \int 10 \sec^2(5x)$$

$$9. \int \frac{1}{\sqrt{1-2x^2}}$$

$$10. \int \frac{1}{2x^2 + 4x + 4}$$

$$11. \int \frac{4}{(x-1)(x-2)(x-3)}$$

$$12. \int \sec(2x) \tan(2x)$$

$$13. \int \frac{\sqrt{9x^2-1}}{x}$$

$$14. \int \frac{2x+41}{x^2+5x-14}$$

$$15. \int \frac{x^3+2x^2+8}{x^2(x^2+4)}$$

$$16. \int \frac{x^3+4x+1}{x^3+3x^2+4x+2}$$

$$17. \int \frac{1}{x \ln(x)}$$

$$18. \int \frac{x^2}{x^2-1}$$

$$19. \int x \sinh(x)$$

$$20. \int \sec 3x + 1)$$

$$21. \int \frac{1}{(x^2+4)^{3/2}}$$

$$22. \int 36x^5 e^{2x^3}$$

$$23. \int x \ln(x+3)$$

$$24. \int \sin(\sqrt{x})$$

$$25. \int \frac{\sin(x)}{1+\cos^2(x)}$$

$$26. \int \frac{e^{3x}}{1+e^{6x}}$$

$$27. \int \sin^{2/5}(x) \cos^3(x)$$

$$28. \int \tan^3(x) \sqrt{\sec(x)}$$

$$29. \int \cos(3x) \cos(x)$$

$$30. \int \cot^3(x)$$

$$31. \int \tan^4(x) \sec^6(x)$$

$$32. \int \cos^{1/3}(x) \sin^3(x)$$

$$33. \int \sin^2(3x) \cos^2(3x)$$

$$34. \int \cot^2(x) \csc^4(x)$$