The Weekly Rigor

51 Problems in Calculating Integrals Using *U*-Substitution with Solutions
(Part 13)

APPENDIX

TYPE 1-3 PROBLEMS IN RANDOM ORDER

Calculate the following integrals.

1. $\int \frac{x}{(3x^2+2)^3} \, dx$

2. $\int \left(\frac{1}{2}x - 50\right)^6 dx$

3. $\int \frac{1}{x-3} \, dx$

4. $\int \frac{x}{\sqrt{3x^2+2}} \, dx$

5. $\int e^{x+3} \, dx$

6. $\int \frac{1}{\sqrt[5]{\frac{3}{7}x-21}} \, dx$

7. $\int e^{31+x} \, dx$

8. $\int \frac{x^2}{\frac{2}{5}x^3 - 3} \, dx$

9. $\int \sqrt{x+1} \, dx$

10. $\int x \cos(3x^2) \, dx$

11. $\int \frac{1}{\left(\frac{3}{4}x-21\right)^5} \, dx$

12. $\int \frac{1}{2x+3} \, dx$

13. $\int (x^3 + 3x)^2 (x^2 + 1) \, dx$

14. $\int \sqrt[6]{x - 50} \, dx$

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

16. $\int \frac{1}{\frac{2}{5}x - 3} \, dx$

17. $\int \cos(x + \pi) \, dx$

18. $\int \frac{1}{(3x+2)^3} \, dx$

19. $\int \frac{1}{(x+2)^3} \, dx$

20. $\int \cos(4x) \, dx$

21. $\int (x+1)^4 \, dx$

22. $\int \sqrt{3x+1} \, dx$

23. $\int \frac{1}{\sqrt{x+2}} \, dx$

24. $\int \sec^2\left(\frac{1}{3}x\right) dx$

25. $\int (3x^2 + 1)^4 x \, dx$

26. $\int \left(\frac{1}{2}x^3 - 50\right)^6 x^2 \, dx$

27. $\int \frac{x}{2x^2+3} \, dx$

28. $\int x^2 \sin\left(\frac{2}{3}x^3 - 5\right) dx$

29. $\int \cot(x) \, dx$

30. $\int x^2 \sqrt[6]{\frac{1}{2}x^3 - 50} \, dx$

31. $\int \sin(x - 5) \, dx$

32. $\int \frac{1}{\sqrt{3x+2}} \, dx$

33. $\int (x - 50)^6 \, dx$

34. $\int \sin(x) \cos(x) \, dx$

35. $\int \frac{1}{\sqrt[5]{x-21}} \, dx$

36. $\int \frac{1}{x+3} \, dx$

37. $\int e^{2x+3} \, dx$

38. $\int (3x + 1)^4 \, dx$

39. $\int \frac{1}{(x-21)^5} \, dx$

40. $\int \frac{x^2}{\sqrt[5]{\frac{3}{7}x^3 - 21}} \, dx$

41. $\int e^{x^2} x \, dx$

42. $\int \sqrt[6]{\frac{1}{2}x - 50} \, dx$

ANSWERS

1. $\frac{-1}{12}(3x^2 + 2)^{-2} + C$ (#31)

2. $\frac{2}{7}\left(\frac{1}{2}x - 50\right)^7 + C$ (#16)

3. $\ln|x - 3| + C$ (#10)

4. $\frac{1}{3}\sqrt{3x^2 + 2} + C$ (#32)

5. $e^{x+3} + C$ (#13)

6. $\frac{35}{12}\sqrt[5]{\left(\frac{3}{7}x - 21\right)^4} + C$ (#22)

7. $e^{31+x} + C$ (#14)

8. $\frac{5}{6}\ln\left|\frac{2}{5}x^3 - 3\right| + C$ (#35)

9. $\frac{2}{3}(x + 1)^{\frac{3}{2}} + C$ (#3)

10. $\frac{1}{6}\sin(3x^2) + C$ (#36)

11. $\frac{-1}{3}\left(\frac{3}{4}x - 21\right)^{-4} + C$ (#20)

12. $\ln\sqrt{2x + 3} + C$ (#23)

13. $\frac{1}{9}(x^3 + 3x)^3 + C$ (#40)

14. $\frac{6}{7}(x - 50)^{\frac{7}{6}} + C$ (#4)

15. $\frac{-1}{4}(x^2 - 4x + 3)^{-2} + C$ (#38)

16. $\ln\sqrt{\left(\frac{2}{5}x - 3\right)^5} + C$ (#24)

17. $\sin(x + \pi) + C$ (#11)

18. $\frac{-1}{6(3x+2)^2} + C$ (#19)

19. $\frac{-1}{2(x+2)^2} + C$ (#5)

20. $\frac{1}{4}\sin(4x) + C$ (#25)

21. $\frac{1}{5}(x + 1)^5 + C$ (#1)

22. $\frac{2}{9}\sqrt{(3x + 1)^3} + C$ (#17)

23. $2\sqrt{x + 2} + C$ (#7)

24. $3\tan\left(\frac{1}{3}x\right) + C$ (#26)

25. $\frac{1}{30}(3x^2 + 1)^5 + C$ (#28)

26. $\frac{2}{21}\left(\frac{1}{2}x^3 - 50\right)^7 + C$ (#29)

27. $\frac{1}{4}\ln(2x^2 + 3) + C$ (#34)

28. $-\frac{1}{2}\cos\left(\frac{2}{3}x^3 - 5\right) + C$ (#37)

29. $\ln|\sin(x)| + C$ (#42)

30. $\frac{4}{7}\left(\frac{1}{2}x^3 - 50\right)^{\frac{7}{6}} + C$ (#30)

31. $-\cos(x - 5) + C$ (#12)

32. $\frac{2}{3}\sqrt{3x + 2} + C$ (#21)

33. $\frac{1}{7}(x - 50)^7 + C$ (#2)

34. $\frac{1}{2}\sin^2(x) + C$ (#41)

35. $\frac{5}{4}(x - 21)^{\frac{4}{5}} + C$ (#8)

36. $\ln|x + 3| + C$ (#9)

37. $\frac{1}{2}e^{2x+3} + C$ (#27)

38. $\frac{1}{15}(3x + 1)^5 + C$ (#15)

39. $\frac{-1}{4(x-21)^4} + C$ (#6)

40. $\frac{35}{36}\left(\frac{3}{7}x^3 - 21\right)^{\frac{4}{5}} + C$ (#33)

41. $\frac{1}{2}e^{x^2} + C$ (#39)

42. $\frac{12}{7}\sqrt[6]{\left(\frac{1}{2}x - 50\right)^7} + C$ (#18)