

Integration Practice

Math 236 Spring 2001

Solve each of the following integrals. It might be a good idea to begin by looking over each of the integrals and trying to figure out which techniques will apply. Practice showing your work clearly and in order because this will be expected of you on quizzes and exams. Check your answers by differentiating whenever possible. There is no excuse for doing these problems wrong and not knowing it!

You do not have to hand in these problems. However, I give you the following three motivations to work on them: (1) your integration skills will improve; (2) I will put at least three of these problems on the next exam; (3) the first person to solve *all* of these problems correctly and give them to me will win a prize!

1. $\int_0^{\frac{\sqrt{3}}{2}} \frac{x^2}{(1-x^2)^{\frac{3}{2}}} dx$

2. $\int x \sec x \tan x dx$

3. $\int \sin^4 x \cos^2 x dx$

4. $\int (e^{3 \ln x})^2 dx$

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

6. $\int \sin^{-1} x dx$

7. $\int \frac{\sec x}{\tan^2 x} dx$

8. $\int \cot^6 x dx$

9. $\int \frac{\frac{1}{2} \ln x}{\sqrt{x}} dx$

10. $\int \sec^4 x dx$

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

12. $\int \csc^4 x \cot^4 x dx$

13. $\int \frac{\ln 2x}{x^2} dx$

14. $\int_0^{\frac{1}{\sqrt{2}}} \frac{\arccos x}{\sqrt{1-x^2}} dx$

15. $\int \sinh^2 3x dx$

16. $\int \sin 7x \cos 2x dx$

17. $\int x^3 \sin x dx$

18. $\int \frac{3x^3 - 2}{x^2 + 4} dx$

19. $\int \cos^7 x dx$

20. $\int \frac{2x^3 - 4x - 8}{(x^2 - x)(x^2 - 4)} dx$

21. $\int_0^1 \ln(1+x^2) dx$

22. $\int 2\pi x(8 - x^{\frac{3}{2}}) dx$

23. $\int \sin(\ln x) dx$

24. $\int \frac{\sqrt{x}}{1 - x\sqrt{x}} dx$

25. $\int \sin^2 x \cos^5 x \, dx$

26. $\int \frac{\sin^3 x}{\sqrt{\cos x}} \, dx$

27. $\int_1^2 \frac{x}{16x^4 - 1} \, dx$

28. $\int \sin^4 2x \, dx$

29. $\int e^x \cos 2x \, dx$

30. $\int \tan^3 x \sec^3 x \, dx$

31. $\int (\ln x)^3 \, dx$

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

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

34. $\int \tan x \ln(\cos x) \, dx$

35. $\int_2^3 \frac{2x - 3}{\sqrt{4x - x^2}} \, dx$

36. $\int \frac{1}{2x^2 - 8x + 9} \, dx$

37. $\int (x \ln x)^{-1} \, dx$

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

39. $\int \frac{1}{x\sqrt{x^4 - 4}} \, dx$

40. $\int e^x \sqrt{1 - e^{2x}} \, dx$

41. $\int \frac{\sqrt{1 - x^2}}{x^4} \, dx$

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

43. $\int \frac{e^{\frac{1}{t}}}{t^2} \, dx$

44. $\int \sec x \, dx$

45. $\int \frac{e^x}{\sqrt{1 - e^{2x}}} \, dx$

46. $\int \frac{\sinh x}{1 + \sinh^2 x} \, dx$

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

48. $\int \tan^5 x \, dx$

49. $\int \sec^4 3x \tan^3 3x \, dx$

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

51. $\int \frac{x^2 + 3x + 7}{\sqrt{x}} \, dx$

52. $\int \csc^3 x \, dx$

53. $\int x(x + 5)^{\frac{7}{2}} \, dx$ *(two ways)*

54. $\int \frac{1}{x^2 - 4x} \, dx$ *(two ways)*

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

56. $\int \frac{x^3}{\sqrt{4 + x^2}} \, dx$ *(three ways)*