

Math 229 Practice – Solutions

1. $2x - 6x^{-3}$
2. $\frac{\frac{1}{2}x^{-\frac{1}{2}}}{(1 + \sqrt{x})^2}$
3. $\frac{1}{2}x^{-\frac{1}{2}} - \frac{1}{3}x^{-\frac{4}{3}}$
4. $\frac{1}{2}x^{-\frac{1}{2}} \sin x + \sqrt{x} \cos x$
5. $7(x - 1)^6(3x + 2)^9 + 27(x - 1)^7(3x + 2)^8$
6. $-\frac{1 + 2x + 3x^2}{(x + x^2 + x^3)^2}$
7. $4\left(3x - \frac{1}{2x^2}\right)^3(3 + x^{-3})$
8. $-(x^{-2} + x^{-3})^{-2}(-2x^{-3} - 3x^{-4})$
9. $-y/x$
10. $2x \sin(x^2) + 2x^3 \cos(x^2)$
11. $-\frac{3}{2}(x^3 - x)^{-\frac{5}{2}}(3x^2 - 1)$
12. $-3(x^4 + 4x^2)^{-4}(4x^3 + 8x)$
13. $\frac{2u}{(1 + u^2)^2} \frac{2x}{(1 + x^2)^2}$
14. $\frac{3\sqrt{x^2 + 1} - (3x - 7)x(x^2 + 1)^{-\frac{1}{2}}}{x^2 + 1}$
15. $\frac{7}{3}(\sqrt{x} + \sqrt[3]{2x})^{\frac{4}{3}}(\frac{1}{2}x^{-\frac{1}{2}} + \frac{2}{3}(2x)^{-\frac{2}{3}})$
16. $5((x^2 + 1)^3 - 7)^4 6x(x^2 + 1)^2$
17. $\frac{-1}{(u - 1)^2}(x + 1)^{-\frac{1}{2}}$
18. $-3 \cot^2 x \csc^2 x$ [using $y = \cot^3 x$]
19. $\frac{1 - 2xy^2}{2x^2y - 1}$
20. $\frac{\frac{1}{2}(1 + \sin x)^{-\frac{1}{2}} \cos^2 x + (1 + \sin x)^{\frac{1}{2}} \sin x}{\cos^2 x}$

21. $\frac{1}{2} \left(x + \sqrt{2x + \sqrt{3x}} \right)^{-\frac{1}{2}} \left(1 + \frac{1}{2} (2x + \sqrt{3x})^{-\frac{1}{2}} \left(2 + \frac{3}{2} (3x)^{-\frac{1}{2}} \right) \right)$
22. $(x^2 + 1)(x^3 + 1) + (x + 1)(2x)(x^3 + 1) + (x + 1)(x^2 + 1)(3x^2)$
23. $\frac{3y - x^{-\frac{2}{3}}}{y^{-\frac{2}{3}} - 3x}$
24. $6x^2(x^3 + 1)(x + 2)^4 \sin x + (x^3 + 1)^2(4(x + 2)^3) \sin x + (x^3 + 1)^2(x + 2)^4 \cos x$
25. $\cos(2 \cos 3x)(-6 \sin 3x)$
26. $5 \left(\frac{x^3 - 8}{x^2 + 4} \right)^4 \frac{3x^2(x^2 + 4) - (x^3 - 8)(2x)}{(x^2 + 4)^2}$
27. $\frac{1}{2} \left(\frac{\sin^2 x}{1 + \cos x} \right)^{-\frac{1}{2}} \frac{2 \sin x \cos x (1 + \cos x) + \sin^3 x}{(1 + \cos x)^2}$
28. $2x + 2x^{-3} - x^{-2}$
29. $\frac{-2 \sin 2x \sqrt{\sin 3x} - \frac{3}{2} \cos 2x (\sin 3x)^{-\frac{1}{2}}}{\sin 3x}$
30. $2 \sec^2 2x + 3 \sec 3x \tan 3x$
31. $6 \sin^2 2x \cos 2x \cos^2 3x - 6 \sin^3 2x \cos 3x \sin 3x$
32. $\tan \frac{1}{x} - \frac{1}{x} \sec^2 \frac{1}{x}$
33. $5 \sin^4 \left(x + \frac{1}{x} \right) \cos \left(x + \frac{1}{x} \right) (1 - x^{-2})$
34. $\frac{2 \sec^2 x \tan x (1 + x^2) - 2x \sec^2 x}{(1 + x^2)^2}$
35. $-\cos^2 \left(\sqrt[3]{x^4 + 1} \right) \sin \left(\sqrt[3]{x^4 + 1} \right) (x^4 + 1)^{-\frac{2}{3}} (4x^3)$
36. $\frac{\cos x (x \cos x) - (1 + \sin x) (\cos x - x \sin x)}{(x \cos x)^2}$
37. $2x + 7[x^3 + (x^4 + x)^2]^6 (3x^2 + 2(x^4 + x)(4x^3 + 1))$
38. $\frac{(\sqrt{3 + 2x} + x(3 + 2x)^{-\frac{1}{2}})(4x - 1) - 4x\sqrt{3 + 2x}}{(4x - 1)^2}$
39. $\frac{\cos(x + y) + \cos(x - y)}{\cos(x - y) - \cos(x + y)}$
40. $\frac{y - \sec^2 x}{\sec^2 y - x}$