

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.  $\frac{7}{3}(\sqrt{x} + \sqrt[3]{2x})^{\frac{4}{3}}\left(\frac{1}{2}x^{-\frac{1}{2}} + \frac{2}{3}(2x)^{-\frac{2}{3}}\right)$
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.  $\frac{y - \sec^2 x}{\sec^2 y - x}$