Integration Practice Solutions 1-48

1. $u = 5x^2 - 3$
$du = 10x\,dx$
$\frac{(5x^2-3)^2}{2} + C$

2. $u = x^2 - 5$
$du = 2x\,dx$
$\frac{(x^2-5)^{3/2}}{3} + C$

3. $u = 5x + 7$
$du = 5\,dx$
$\frac{(5x+7)^{21}}{105} + C$

4. $u = \sin 3x$
$du = 3\cos 3x\,dx$
$\frac{\sin^2(3x)}{6} + C$

OR

$u = \cos(3x)$
$du = -3\sin(3x)$
$\frac{\cos^2(3x)}{-6} + C$

5. $u = \sec x$
$du = \sec x \tan x\,dx$
$\left[\frac{\sec^2(x)}{2}\right]_0^{\pi/4} = 1/2$

6. Same as #3

7. $u = \sin 2x$
$du = 2\cos 2x\,dx$
$\frac{\sin^2(2x)}{4} + C$

or

$u = \cos 2x$
$du = -2\sin 2x\,dx$
$\frac{-\cos^2(2x)}{4} + C$

8. $u = 10 - x^2$
$du = -2x\,dx$
$-\frac{9}{4}(10-x^2)^{2/3} + C$

9. $u = x - 1$
$du = dx$
$\frac{-1}{x-1} + C$

10. $u = x^3 + 3x$
$du = (3x^2+3)\,dx$
$\frac{-1}{12(x^3+3x)^4} + C$

11. $u = \sqrt{x}$
$du = \frac{1}{2\sqrt{x}}\,dx$
$-2\cos\sqrt{x} + C$

12. $u = x^3$

$du = 3x^2 dx$

$$\frac{\tan(x^3)}{3} + C$$

13. $u = \frac{3}{x}$

$du = -\frac{3}{x^2} dx$

$$-\frac{\sin\left(\frac{3}{x}\right)}{3} + C$$

14. $u = 1 - \cos(2x)$

$du = 2\sin(2x)$

$$-\frac{1}{4(1-\cos(2x))^2} + C$$

15. $u = \sin x$

$du = \cos x dx$

$$-\cos(\sin x) + C$$

16. $u = 3x + 4$

$du = 3dx$

$$\frac{2(3x+4)^{3/2}}{9} + C$$

17. $u = 3 - 5t^5$

$du = -25t^4 dt$

$$\frac{-3(3-5t^5)^{4/3}}{100} + C$$

18. $u = 5 + 2x^3$

$du = 6x^2 dx$

$$\frac{(5+2x^3)^9}{54} + C$$

19. $x^5 - 2x^4 + 3x^3 - x^2 + 7x + C$

20. $\int \left(x^{3/2} - 4x^{1/2} - 4x^{-1/2}\right) dx$

$$= \frac{2x^{5/2}}{5} - \frac{8x^{3/2}}{3} - 8x^{\frac{1}{2}} + C$$

21. $\int \left(x^{3/2} + x^{-1/2}\right) dx$

$$= \frac{2x^{5/2}}{5} + 2x^{\frac{1}{2}} + C$$

22. $u = 3a^2 + 1$

$du = 6a\, da$

$$\frac{(3a^2+1)^{1/2}}{3} + C$$

23. $\int (5t^{2/3} + 7t^{-4/3})\,dt$

$= 3t^{5/3} - 21t^{-1/3} + C$

24. $\frac{3x^{4/3}}{4} + \frac{3x^{2/3}}{2} + C$

25. $u = 1 - 8x^3$

$du = -24x^2\,dx$

$\frac{1}{18(1-8x^3)^3} + C$

26. $\int (x^{4/3} - 4x^{1/3})\,dx$

$= \frac{3x^{7/3}}{7} - 3x^{4/3} + C$

27. $u = 6 - 2x$

$du = -2dx$

$\frac{-3(6-2x)^{4/3}}{8} + C$

28. $u = 2x - 1$

$du = 2dx$

$\frac{1}{2}\int u^{-5}\,du = \frac{-1}{8}u^{-4} + C$

$= -\frac{1}{8}\left(\frac{1}{(2x-1)^4}\right) + C$

29. $u = 1 - x$

$du = -dx$

$\frac{(1-x)^{-6}}{3} + \frac{2(1-x)^{-5}}{5} + C$

30. $x - \frac{3}{x} + C$

31. $4t^{1/2} + C$

32. $u = 1 - 2y^4$

$du = -8y^3\,dy$

$\frac{1}{32(1-2y^4)^4} + C$

33. $u = 3x$

$\frac{du}{3} = \frac{8\,dx}{8}$

$\frac{2^{3x}}{3\ln 2} + C = \frac{2^{3x}}{\ln 8} + C$

34. $\int (\tan^2 x + 2\sec x \tan x + \sec^2 x)\,dx$

$= \tan x - x + 2\sec x + \tan x + C$

$= 2\tan x + 2\sec x - x + C$

35. $u = x^2 + 5x$

$du = (2x+5)\,dx$

$\frac{(x^2+5x)^8}{8} + C$

36. $u = 3 - x$

$du = -dx$

$\frac{-(3-x)^{11}}{11} + C$