

MATH 116: Integration Practice

1. $\int_1^3 3x^2 dx$

2. $\int (2x^3 - x + 7) dx$

3. $\int \left(x^{4/3} + \sqrt{x} + \frac{1}{x} \right) dx$

4. $\int_0^\pi \sin(\theta) d\theta$

5. $\int \cos(3x) dx$

6. $\int e^{-2x} dx$

7. $\int \frac{1 + z\sqrt{z}}{z^2} dz$

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

9. $\int \sec x (\sec x + \tan x) dx$

10. $\int_0^1 |3x - 2| dx$

11. $\int 2te^{t^2} dt$

12. $\int x \cos(x) dx$

13. $\int \frac{\ln(x)}{x} dx$

14. $\int x\sqrt{x^2 + 4} dx$

15. $\int (t+2)(t+3)^{999} dt$

16. $\int_0^{\pi/2} \sin^2(x) \cos(x) dx$

17. $\int x3^x dx$

18. $\int \sqrt{x} \ln(x) dx$

19. $\int \frac{r}{(r+1)^4} dr$

20. $\int x^2 \sin(x) dx$

21. $\int x \sin(x^2) dx$

22. $\int \tan^{-1}(x) dx$

23. $\int \frac{x^2 + 2x}{(x^3 + 3x^2 + 12)^6} dx$

24. $\int \tan(x) dx$

25. $\int \cot^2(\theta) d\theta$

26. $\int w^3 \sqrt{w^2 + 1} dw$

27. $\int x^2 e^{4x} dx$

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


29. $\int_0^2 (x^2 - |1 - x^2|) dx$


30. $\int e^x \cos(x) dx$


31. $\int \frac{\sin(2x)}{\sin^3(x)} dx$


32. $\int e^{x+e^x} dx$


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

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

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

36.  $\int_0^{\pi/4} \sqrt{1 + \cos(2x)} dx$

37.  $\int \tan(\sin^{-1}(x)) dx$

38.  $\int_{-1}^1 \frac{x^3}{1+e^{x^2}} dx$

Answers

(For indefinite integrals, answers in other forms may also be correct. Differentiate to find out!)

1. 26
2. $\frac{x^4}{2} - \frac{x^2}{2} + 7x + C$
3. $\frac{3}{7}x^{7/3} + \frac{2}{3}x^{3/2} + \ln|x| + C$
4. 2
5. $\frac{\sin(3x)}{3} + C$
6. $-\frac{1}{2}e^{-2x} + C$
7. $-z^{-1} + 2\sqrt{z} + C$
8. $\frac{x^8}{8} + \frac{2x^5}{5} + \frac{x^2}{2} + C$
9. $\tan x + \sec x + C$
10. $\frac{5}{6}$
11. $e^{t^2} + C$
12. $x \sin x + \cos x + C$
13. $\frac{(\ln x)^2}{2} + C$
14. $\frac{(x^2 + 4)^{3/2}}{3} + C$
15. $\frac{(t + 3)^{1001}}{1001} + \frac{(t + 3)^{1000}}{1000} + C$
16. $\frac{1}{3}$
17. $\frac{x3^x}{\ln 3} - \frac{3^x}{(\ln 3)^2} + C$
18. $\frac{2}{3}x^{3/2} \ln x - \frac{4}{9}x^{3/2} + C$
19. $\frac{-1}{2(r + 1)^2} + \frac{1}{3(r + 1)^3} + C$
20. $-x^2 \cos x + 2x \sin x + 2 \cos x + C$
21. $-\frac{1}{2} \cos(x^2) + C$
22. $x \tan^{-1}(x) - \frac{1}{2} \ln(1 + x^2) + C$
23. $\frac{-1}{15}(x^3 + 3x^2 + 12)^{-5} + C$
24. $-\ln|\cos x| + C$
25. $-\cot \theta - \theta + C$
26. $\frac{1}{5}(w^2 + 1)^{5/2} - \frac{1}{3}(w^2 + 1)^{3/2} + C$
27. $\frac{x^2 e^{4x}}{4} - \frac{x e^{4x}}{8} + \frac{e^{4x}}{32} + C$
28. $\frac{1}{2} \arctan\left(\frac{x}{2}\right) + C$
29. $\frac{2}{3}$
30. $\frac{e^x(\sin x + \cos x)}{2} + C$
31. $-2 \csc(x) + C$
32. $e^{e^x} + C$
33. $\frac{x(\sin(\ln x) - \cos(\ln x))}{2} + C$
34. $\arcsin(e^x) + C$
35. $x - \frac{2}{3}x^{3/2} + C$
36. 1
37. $-\sqrt{1 - x^2} + C$
38. 0