

Integrate.

1. $\int \frac{3x-1}{x^2+3x-10} dx$

2. $\int \cos^7 3x dx$

3. $\int x^2 \ln x dx$

4. $\int x^2 e^x dx$

Answers:

1. $\frac{16}{7} \ln|x+5| + \frac{5}{7} \ln|x-2| + C$ 2. $\frac{1}{3} \sin(3x) - \frac{1}{3} \sin^3(3x) + \frac{1}{5} \sin^5(3x) - \frac{1}{21} \sin^7(3x) + C$
3. $\frac{1}{3} x^3 \ln x - \frac{1}{9} x^3 + C$ 4. $x^2 e^x - 2x e^x + 2e^x + C$

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

6. $\int \frac{2x^2 + 17x + 16}{x^2 + 8x + 7} dx$

7. $\int x \sec(x^2 + 4) dx$

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

Answers:

5. $\frac{1}{8}x - \frac{1}{32}\sin(4x) + C$

6. $2x + \frac{5}{6}\ln|x+7| + \frac{1}{6}\ln|x+1| + C$

7. $\frac{1}{2}\ln|\sec(x^2+4) + \tan(x^2+4)| + C$

8. $\frac{1}{2}\ln|x^2+4| + \tan^{-1}\left(\frac{1}{2}x\right) + C$

9. $\int e^x \sin x \, dx$

10. $\int \sin^5 x \, dx$

11. $\int \tan^2 2x \, dx$

12. $\int \frac{dx}{x^2 + 2x}$

Answers:

9. $-\frac{1}{2}e^x \cos x + \frac{1}{2}e^x \sin x + C$ 10. $-\cos x + \frac{2}{3}\cos^3 x - \frac{1}{5}\cos^5 x + C$
11. $\frac{1}{2}\tan(2x) - x + C$ 12. $\frac{1}{2}\ln|x| - \frac{1}{2}\ln|x+2| + C$

13. $\int e^x \cos x \, dx$

14. $\int_0^{\frac{\pi}{2}} x^3 \cos 2x \, dx$

15. $\int \tan^5 x \sec^4 x \, dx$

16. $\int_1^{\infty} x e^{-x} \, dx$

Answers:

13. $\frac{1}{2}e^x \sin x + \frac{1}{2}e^x \cos x + C$ 14. $\frac{1}{2}x^3 \sin(2x) + \frac{3}{4}x^2 \cos(2x) + \frac{3}{4}x \sin(2x) - \frac{3}{8} \cos(2x) = -\frac{3\pi^2}{16}$
15. $\frac{1}{8}\tan^8 x + \frac{1}{6}\tan^6 x + C$ 16. $\frac{2}{e}$

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

18. $\int \csc x \, dx$

19. $\int \frac{2 \, dx}{\sqrt{9-x^2}}$

20. $\int \tan^{-1} x \, dx$

Answers:

17. $-3\sqrt{3-x^2} + C$

18. $\ln|\csc x - \cot x| + C$

19. $2\sin^{-1}\left(\frac{1}{3}x\right) + C$

20. $x \tan^{-1} x - \frac{1}{2} \ln|1+x^2| + C$

21. $\int_1^2 \frac{dx}{x-2}$

22. $\int_{-\infty}^{\infty} e^{2x} dx$

23. $\int_{-\infty}^{-1} \frac{dx}{x^2}$

24. $\int_0^1 \frac{dx}{1-x}$

Answers:

21. $-\infty \therefore$ Diverges

22. $\infty \therefore$ Diverges

23. 1

24. $\infty \therefore$ Diverges