

$$1. \int \frac{x \, dx}{4 + 9x^4}$$

$$2. \int \frac{x^3 \, dx}{4 + x^4}$$

$$3. \int \frac{e^{4x} \, dx}{\sqrt{9 - e^{8x}}}$$

$$4. \int x e^{5x^2} \, dx$$

$$5. \int \frac{e^{4x} \, dx}{\sqrt{9 - e^{4x}}}$$

$$6. \int x 3^{x^2} \, dx$$

$$7. \int \frac{e^{\sqrt{x}}}{\sqrt{x}} \, dx = \int e^{\sqrt{x}} \frac{1}{\sqrt{x}} \, dx$$

$$8. \int \frac{\cos \sqrt{x}}{\sqrt{x}} \, dx$$

$$9. \int \cos \sqrt{x} \, dx$$

$$10. \int e^{\sqrt{x}} \, dx$$

$$11. \int \frac{dx}{\sqrt{2 - 3x}}$$

$$12. \int \frac{\ln x}{x} \, dx = \int (\ln x) \frac{1}{x} \, dx$$

$$13. \int \frac{e^{3x}}{e^{3x} + 5} \ln(e^{3x} + 5) \, dx$$

$$14. \int \ln x \, dx$$

$$15. \int \text{Arcsin } x \, dx$$

$$16. \int x \text{Arctan } x \, dx$$

$$17. \int e^{\cos 3x} \sin 3x \, dx$$

$$18. \int 5^{\cos 3x} \sin 3x \, dx$$

$$19. \int x^5 \ln x \, dx$$

$$20. \int \sin^2 5x \, dx$$

$$21. \int \cos^4 3x \, dx$$

$$22. \int \sin^4 x \cos^5 x \, dx$$

$$23. \int \tan^4 x \sec^4 x \, dx$$

$$24. \int \tan^3 x \sec^3 x \, dx$$

$$25. \int \frac{dx}{\sqrt{x}(1+x)}$$

In 26–27, use a trigonometric substitution.

$$26. \int \frac{du}{\sqrt{u^2 - a^2}}$$

$$27. \int \sqrt{a^2 - u^2} \, du$$

$$28. \int \frac{3x + 4}{\sqrt{8 + 2x - x^2}} \, dx$$

$$29. \int \frac{3x + 4}{x^2 - 6x + 13} \, dx$$

Answers

30. $\int x^3 e^{x^2} dx = \int (x^2)[e^{x^2} x dx] = \int (u)[dv]$
31. $\int x^3 \cos x^2 dx = \int (x^2)[\cos x^2 x dx] = \int (u)[dv]$
32. $\int \frac{x^3 dx}{\sqrt[3]{5+x^2}} = \int (x^2)[(5+x^2)^{-\frac{1}{3}} x dx] = \int (u)[dv]$
33. Find the partial fraction decomposition. Be sure to find A.B.C, etc. There is nothing to be integrated.
- (a) $\frac{3x}{(x-1)(x+2)^2}$
- (b) $\frac{x}{(x-1)(x^2-2x+2)}$
34. Integrate by parts twice. Use circular integration to show
- (a) $\int e^{ax} \cos bx dx = \frac{e^{ax}}{a^2+b^2} (a \cos bx + b \sin bx) + C$
- (b) $\int e^{ax} \sin bx dx = \frac{e^{ax}}{a^2+b^2} (a \sin bx - b \cos bx) + C$
1. $\frac{1}{12} \text{Arctan} \frac{3x^2}{2} + C$
2. $\frac{1}{4} \ln(4+x^4) + C$
3. $\frac{1}{4} \text{Arcsin} \frac{e^{4x}}{3} + C$
4. $\frac{1}{10} e^{5x^2} + C$
5. $-\frac{1}{2} \sqrt{9-e^{4x}} + C$
6. $\frac{1}{2 \ln 3} 3^{x^2} + C$
7. $2e^{\sqrt{x}} + C$
8. $2 \sin \sqrt{x} + C$
9. $2(\sqrt{x} \sin \sqrt{x} + \cos \sqrt{x}) + C$
10. $2(\sqrt{x}-1)e^{\sqrt{x}} + C$
11. $-\frac{2}{3} \sqrt{2-3x} + C$
12. $\frac{1}{2} (\ln x)^2 + C$
13. $\frac{1}{6} [\ln(e^{3x}+5)]^2 + C$
14. $x \ln x - x + C$
15. $x \text{Arcsin} x + \sqrt{1-x^2} + C$
16. $\frac{1}{2} (x^2 \text{Arctan} x - x + \text{Arctan} x) + C$

17. $-\frac{1}{3}e^{\cos 3x} + C$

18. $-\frac{1}{3\ln 5}5^{\cos 3x} + C$

19. $\frac{x^6}{6} \left(\ln x - \frac{1}{6} \right) + C$

20. $\frac{x}{2} - \frac{1}{20} \sin 10x + C$

21. $\frac{1}{4} \left(\frac{3}{2}x + \frac{1}{3} \sin 6x + \frac{1}{24} \sin 12x \right) + C$

22. $\frac{1}{5} \sin^5 x - \frac{2}{7} \sin^7 x + \frac{1}{9} \sin^9 x + C$

23. $\frac{1}{5} \tan^5 x + \frac{1}{7} \tan^7 x + C$

24. $\frac{1}{5} \sec^5 x - \frac{1}{3} \sec^3 x + C$

25. $2 \operatorname{Arctan} \sqrt{x} + C$