

Integrate using U-Substitution

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

2. $\int (3x+4)^3 dx$

3. $\int 3e^{3x} dx$

4. $\int 5(x+3)^4 \sqrt{(x+3)^5} dx$

5. $\int \frac{6x^3}{\sqrt[4]{1+x^4}} dx$

6. $\int (7x-x^5)^5 (7-5x^4) dx$

7. $\int \sqrt{\tan x} (\sec^2 x) dx$

8. $\int \frac{\cos x}{\sqrt{2+\sin x}} dx$

9. $\int \frac{dx}{(1-x)^2}$

10. $\int (1-\sin(2t))^{3/2} \cos(2t) dt$

1. $\frac{1}{3}\sin(x^3) + c$

3. $e^{3x} + c$

5. $2(1+x^4)^{3/4} + c$

7. $\frac{2(\tan x)^{3/2}}{3} + c$

9. $\frac{1}{1-x} + c$

2. $\frac{(3x+4)^4}{12} + c$

4. $\frac{2[(x+3)^5]^{3/2}}{3} + c$

6. $\frac{1}{6}(7x-x^5)^6 + c$

8. $2(2+\sin x)^{1/2} + c$

10. $-\frac{1}{5}[1-\sin(2t)]^{5/2} + c$

Integrate using Trig Substitution

1. $\int \frac{4}{\sqrt{4-x^2}} dx$

2. $\int \frac{9}{\sqrt{16+x^2}} dx$

3. $\int \sqrt{25-x^2} dx$

4. $\int \frac{x-2}{\sqrt{5+4x-x^2}} dx$

5. $\int \frac{6}{\sqrt{4-(x-1)^2}} dx$

6. $\int \frac{dy}{y^2-2y+5}$

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

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

$$1. 4 \sin^{-1}\left(\frac{x}{2}\right) + c$$

$$3. \frac{5x \cos(\sin^{-1}(\frac{x}{5}))}{2} + \frac{\sin^{-1}(\frac{x}{5})}{2} + c$$

$$5. 6 \sin^{-1}\left(\frac{x-1}{2}\right) + c$$

$$7. \frac{1}{4} \tan^{-1}\left(\frac{x}{2}\right) + c$$

$$2. 9 \ln \left| \sec(\tan^{-1}(\frac{x}{4})) + \frac{x}{4} \right| + c$$

$$4. -3 \cos(\sin^{-1}(\frac{x-2}{3})) + c$$

$$6. \frac{1}{2} \tan^{-1}\left(\frac{y-1}{2}\right) + c$$

$$8. \frac{1}{3} \sin^{-1} x + c$$

Integration by Parts

1. $\int (\sin x)e^x dx$

2. $\int x \cos x dx$

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

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

5. $\int x^3 e^x dx$

6. $\int (x^2 + x + 1)e^x dx$

7. $\int x^4 e^{-x} dx$

8. $\int \arcsin x dx$

hint : derivative of $\arcsin x = \frac{1}{\sqrt{1-x^2}}$

$$1. \frac{\sin(x)e^x}{2} - \frac{e^x \cos x}{2} + c$$

$$3. \frac{x^4 \ln x}{4} - \frac{x^4}{16} + c$$

$$5. x^3 e^x - 3x^2 e^x + 6x e^x - 6e^x + c$$

$$7. -x^4 e^{-x} - 4x^3 e^{-x} - 12x^2 e^{-x} - 24x e^{-x} - 24e^{-x} + c$$

$$2. x \sin x + \cos x + c$$

$$4. 2x \tan(2x) + \ln |\cos(2x)| + c$$

$$6. (x^2 + x + 1)e^x - (2x + 1)e^x + 2e^x + c$$

$$8. x \arcsin x + \sqrt{1 - x^2} + c$$

Integration using Partial Fraction

1. $\int \frac{5x-13}{(x-3)(x-2)} dx$

2. $\int \frac{x+1}{x^2(x-1)} dx$

3. $\int \frac{y}{y^2-2y-3} dy$

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

5. $\int \frac{dx}{(x^2-1)^2}$

6. $\int \frac{x^2-4x+4}{x^3+1} dx$

1. $2\ln|x-3|+3\ln|x-2|+c$

3. $\frac{3}{4}\ln|y-3|+\frac{1}{4}\ln|y+1|+c$

5. $-\frac{1}{4}\ln\left|\frac{x-1}{x+1}\right|+\frac{x}{2(x^2-1)}+c$

2. $-2\ln|x|+\frac{1}{x}+2\ln|x-1|+c$

4. $\frac{1}{3}x^3-x+\ln|x^2+1|+\tan^{-1}x+c$

6. $3\ln|x+1|-\ln|x^2-x+1|+c$