Lösungen

1

a

```
Integrate[x^2 Cos[x], x] + c
```

$$c + 2\,x\,\text{Cos}[x] + (-2 + x^2)\,\text{Sin}[x]$$

b

```
Integrate[Sin[2x] Cos[x/2], x] + c
```

$$c - \frac{1}{3}\,\text{Cos}\left[\frac{3\,x}{2}\right] - \frac{1}{5}\,\text{Cos}\left[\frac{5\,x}{2}\right]$$

c

```
Ln[x_]:=Log[x]
```

```
Integrate[Ln[2x], x] + c
```

$$c - x + x\,\text{Log}[2\,x]$$

```
Integrate[Ln[2x], {x,1,2}]
```

$$-1 + \text{Log}[8]$$

```
N[%]
```

```
1.07944
```

d

```
Integrate[x^3 E^x, x] + c
```

$$c + e^x\,(-6 + 6\,x - 3\,x^2 + x^3)$$

```
Integrate[x^3 E^x, {x,0,1}]
```

$$6 - 2\,e$$

```
N[%]
```

```
0.563436
```

e

Integrate[Cos[x]^2, x] + c

$$c + \frac{x}{2} + \frac{1}{4}\,\text{Sin}[2\,x]$$

Integrate[Cos[x]^2, {x,0, 2Pi}]

$$\pi$$

N[%]

3.14159

2

a

Integrate[x Sqrt[x^2-4], x] + c

$$c + \frac{1}{3}\,(-4 + x^2)^{3/2}$$

b

Integrate[Cos[x]^5 Sin[x], x] + c

$$c - \frac{5}{64}\,\text{Cos}[2\,x] - \frac{1}{32}\,\text{Cos}[4\,x] - \frac{1}{192}\,\text{Cos}[6\,x]$$

c

Integrate[x Sqrt[1+x^2], x] + c

$$c + \frac{1}{3}\,(1 + x^2)^{3/2}$$

Integrate[x Sqrt[1+x^2], {x,0,1}]

$$\frac{1}{3}\left(-1 + 2\sqrt{2}\right)$$

N[%]

0.609476

d

```
Integrate[Sqrt[4-x^2], x] + c
```

$$c + \frac{1}{2} x \sqrt{4 - x^2} + 2 \text{ArcSin}\left[\frac{x}{2}\right]$$

e

```
Integrate[1/Sqrt[4+x^2], x] + c
```

$$c + \text{ArcSinh}\left[\frac{x}{2}\right]$$

```
Integrate[1/Sqrt[4+x^2], {x,0, 1}]
```

$$\text{ArcSinh}\left[\frac{1}{2}\right]$$

```
N[%]
```

```
0.481212
```

3

```
Integrate[Cos[a x] Sin[a x],{x,0,b}]^2
```

$$\frac{\text{Sin}[a\, b]^4}{4\, a^2}$$

```
Integrate[Cos[a x]^2,{x,0,b}]
```

$$\frac{2\, a\, b + \text{Sin}[2\, a\, b]}{4\, a}$$

```
Integrate[Sin[a x]^2,{x,0,b}]
```

$$\frac{b}{2} - \frac{\text{Sin}[2\, a\, b]}{4\, a}$$

```
Integrate[Cos[a x]^2,{x,0,b}]*Integrate[Sin[a x]^2,{x,0,b}] //Expand
```

$$\frac{b^2}{4} - \frac{\text{Sin}[2\, a\, b]^2}{16\, a^2}$$

4

a

```
Integrate[x^2/(x^3-7),x] + c
```

$$c + \frac{1}{3} \text{Log}[-7 + x^3]$$

b

Integrate[E^{2x}/(E^{2x}+7),x] + c

$$\left\{c + \frac{1}{2}\,\text{Log}[7 + e^{2x}]\right\}$$

c

Integrate[(2 Cos[2x] + 4x + E^(-x)) /(Sin[2x] + 2x^2 - E^(-x) + 4),x] + c

$$c - x + \text{Log}[-1 + 2\,e^{x}\,(2 + x^{2}) + e^{x}\,\text{Sin}[2\,x]]$$

d

Integrate[Cot[x],x] + c //Expand

$$c + \text{Log}[\text{Sin}[x]]$$

5

a

Apart[1/(x(x-1))]

$$\frac{1}{-1 + x} - \frac{1}{x}$$

Integrate[1/(x(x-1)),x] + c

$$c + \text{Log}[-1 + x] - \text{Log}[x]$$

b

Apart[(x^4-16 x-3)/((x^2+1)(x-1)^2 (x+2))]

$$-\frac{3}{(-1 + x)^{2}} + \frac{2}{-1 + x} + \frac{1}{2 + x} + \frac{3 - 2\,x}{1 + x^{2}}$$

Integrate[(x^4-16 x-3)/((x^2+1)(x-1)^2 (x+2)),x] + c

$$c + \frac{3}{-1 + x} + 3\,\text{ArcTan}[x] + 2\,\text{Log}[-1 + x] + \text{Log}[2 + x] - \text{Log}[1 + x^{2}]$$

c

Apart[(x^4-16 x-3)/((x^2+1)(x-1)^2)]

$$1 - \frac{9}{(-1+x)^2} + \frac{3}{-1+x} + \frac{8-x}{1+x^2}$$

Integrate[(x^4-16 x-3)/((x^2+1)(x-1)^2),x] + c

$$c + \frac{9}{-1+x} + x + 8\,\text{ArcTan}[x] + 3\,\text{Log}[-1+x] - \frac{1}{2}\,\text{Log}[1+x^2]$$

d

Apart[(x^2-6 x-6)/(x^2(x^2+3 x+3))]

$$-\frac{2}{x^2} + \frac{3}{3+3x+x^2}$$

Integrate[(x^2-6 x-6)/(x^2(x^2+3 x+3)),x] + c

$$c + \frac{2}{x} + 2\sqrt{3}\,\text{ArcTan}\left[\frac{3+2x}{\sqrt{3}}\right]$$

e

Apart[(90 x^3-76 x^2-25 x+19)/((2 x-1)(3 x+1)(5 x-3))]

$$3 + \frac{1}{-1+2x} + \frac{2}{1+3x} - \frac{7}{-3+5x}$$

Integrate[(90 x^3-76 x^2-25 x+19)/((2 x-1)(3 x+1)(5 x-3)),x] + c

$$c + 3x + \frac{1}{2}\,\text{Log}[-1+2x] + \frac{2}{3}\,\text{Log}[1+3x] - \frac{7}{5}\,\text{Log}[-3+5x]$$