

# KIX 1001: ENGINEERING MATHEMATICS 1

## Tutorial 8: Integration

1) Find

$$\int \ln(x^2 + 2) dx$$

2) Find

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

3) Find

$$\int x^3 e^{x^2} dx$$

4) Find

$$\int \frac{(x + 1)}{x^3 + x^2 - 6x} dx$$

5) Find

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

6) Find

$$\int \tan^3(3x) \sec^4(3x) dx$$

7) Find

$$\int \sin^4(x) \cos^7(x) dx$$

8) Find

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

### Additional exercises

Please integrate

1.  $\int \frac{x + 7}{x^2 (x + 2)} dx$

2.  $\int \frac{\cos x}{\sin^3 x + \sin x} dx$

Answer:

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

2.  $\frac{x^3}{3} \ln x - \frac{1}{9}x^3 + C$

3.  $\frac{1}{2}e^{x^2}(x^2 - 1) + C$

4.  $-\frac{1}{6} \ln|x| + \frac{3}{10} \ln|x + 2| - \frac{2}{15} \ln|x + 3| + C$

5.  $\tan^{-1} x + \frac{1}{2} \ln(x^2 + 2) + C$

6.  $\frac{1}{12} \tan^4(3x) + \frac{1}{18} \tan^6(3x) + C$

7.  $\frac{1}{6} \sin^6 x - \frac{3}{7} \sin^7 x + \frac{1}{3} \sin^9 x - \frac{1}{11} \sin^{11} x + C$

8.  $-\frac{1}{9} \frac{\sqrt{9-x^2}}{x} + C$

Additional exercises (Solutions)

1.  $-\frac{5}{4} \ln|x| - \frac{7}{2x} + \frac{5}{4} \ln|x + 2| + C$

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