

9 Repetition

9.1 Calculate

$$2 + \frac{4}{2} \cdot 3, \quad 1 - \frac{3}{2} \cdot 4, \quad \frac{1}{3} + \frac{2}{5}, \quad \frac{2}{3} + 1.$$

9.2 Calculate

$$\frac{3^3 \cdot 3^{-2}}{3^4} \cdot \frac{(-3)}{3^{-2}}, \quad (-3\sqrt{5})^2, \quad \frac{\frac{2}{3} + \frac{3}{4}}{\frac{5}{2}}, \quad \sqrt{7 + (3\sqrt{2})^2}.$$

9.3 Calculate

$$\sin\left(\frac{\pi}{6}\right) + \cos\left(\frac{3\pi}{4}\right) - \cos(-\pi), \quad \log(20) + \log(50), \quad \ln(e^3) + \ln(1).$$

9.4 Reduce the expressions

$$(x + 5)^2, \quad (1 - 2x)^2, \quad (2y - 1)(2y + 1), \quad (x^2 + y^2) - (2x^2 - y^2).$$

9.5 Reduce the expressions

$$\frac{x^2 + y^2 - 2xy}{x^2 - xy}, \quad \frac{x^2 - y^2}{x^2 - xy}, \quad \frac{y^2 - x^2}{x + y} + x.$$

9.6 Solve the equations

$$-2x + 3 = 7, \quad \frac{2}{3}x - 3 = \frac{6}{5}, \quad x^2 - 2x - 3 = 0.$$

9.7 Solve the equations

$$\frac{2}{x} + 2x = 3x, \quad -2x^2 + x + 1 = 0.$$

9.8 Determine at least one solution to the equations

$$e^{2x-1} - 1 = 0, \quad \sin(x - \pi) = \frac{\sqrt{3}}{2}, \quad \ln(x - 1) = \ln(12) - \ln(4).$$

9.9 For which values of a are the following expressions true

$$\begin{aligned} \frac{1}{1+a} &= \frac{\sqrt{5}}{\sqrt{5}+a}, & \frac{1}{1+a} &= \frac{1-a}{1-a^2}, \\ \frac{1}{1+a} &= \frac{1+a}{a^2+2a+1}, & \frac{1}{1+a} &= 1 + \frac{1}{a}. \end{aligned}$$

9.10 Differentiate the functions

$$f(x) = 2x^3 - x^2 + 1, \quad g(x) = 2x^{-2} + x, \quad h(x) = \frac{2}{x} + x.$$

9.11 Determine the integrals

$$\int 2x^2 + 1 \, dx, \quad \int_0^1 x^2 - 3x + 1 \, dx, \quad \int_0^4 \frac{1}{\sqrt{x}} + x \, dx.$$

9.12 Differentiate the functions

$$\begin{aligned} f(x) &= 2x^3 - x^{-2} + 4x^{-1} - 1, \\ g(x) &= 3xe^3 - \sqrt{x-1}, \\ h(x) &= 2xe^x - \sin(x^2 - x). \end{aligned}$$

9.13 Determine the integrals

$$\int 2e^{-x} \, dx, \quad \int_0^1 4xe^{x^2} \, dx, \quad \int_0^2 \frac{2x}{\sqrt{x^2+5}} \, dx$$