2 Math101 exercises

2.1 Solve the equations:

$$4x + 2 = 26, \quad -3x - 5 = 0, \quad -5x + 7 = -28, \quad 8x + 13 = 5.$$

2.2 Solve the equations:

$$x^2 = 9, \quad (x-3)(x+7) = 0, \quad 2x^2 - 6x + 4 = 0, \quad x^2 + 4x - 5 = 0.$$

2.3 Solve the equations:

$$3x + 7 = -(2x + 3), \quad 3(x-4) = 2(x+1), \quad -3x - 2 = -x + 3.$$

2.4 Solve the equations:

$$2x^2 - 6x = 0, \qquad 3x^2 - 2x = 0, \qquad x^2 = \frac{1}{2}x, \qquad 25\Big(\frac{x}{2}\Big)^2 = 1.$$

2.5 Determine a such that the equation

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

has no solution.

2.6 Factorize the polynomials to reduce the fractions:

$$\frac{x^2 - 25}{x^2 + 4x - 5}, \qquad \frac{x^2 - 3x + 2}{x^2 - 5x + 6}, \qquad \frac{(x+2)(x^2 - 3x - 10)}{x^2 + 4x + 4}.$$

2.7 Determine a such that $x = 2$ becomes a solution to the equation

$$\frac{a}{4} + ax = 1.$$

2.8 Solve the equations:

$$-(x+3) + 2x = 2(x-1) - x - 1, \qquad 3(x-3) + 2 = 3x - 5.$$

2.9 Solve the equations:

$$\frac{2}{3}\Big(x - \frac{4}{5}\Big) = \frac{2}{3}, \qquad \frac{1}{3}(x-2) = -\frac{2}{5}\Big(x - \frac{3}{4}\Big)$$

2.10 Solve the equations:

$$-\frac{1}{4}x^2 - 2x = -5, \quad \frac{1}{2}x^2 + 3x = -\frac{5}{2}, \quad x^2 - \frac{5}{6}x + \frac{1}{6} = 0, \quad 2x^2 = 1000.$$

2.11 Solve the equations:

$$\sqrt{2}x + 1 = \sqrt{2} + 5, \quad \pi(2x - 6) = \sqrt{8}x + 12, \quad \sqrt{2}(2\sqrt{2}x + \sqrt{8}) = x - 1.$$

2.12 Write quadratic equations on the form $x^2 + bx + c = 0$ with roots

$$1 \text{ and } 1, \qquad \frac{1}{3} \text{ and } -1, \qquad -\sqrt{2} \text{ and } \sqrt{8}.$$

2.13 For which values of b does the equation

$$\frac{7}{6}x^2 + bx + \frac{21}{2} = 0,$$

have exactly one solution?

2.14 Solve the equations:

$$x^4 - 3x^2 + 2 = 0, \qquad x^4 = \frac{17}{4}x^2 - 1.$$

(Hint: substitute $y = x^2$.)