Mathematics in Life Sciences **Winter Semester 2025**

List of Exercises 1

1. Find the roots of the following polynomials:

a) $x^2 - 4$	**b)** $x^2 - 5x + 6$	**c)** $3x^2 - 27$
d) $2x^2 - 16$	**e)** $x^2 + 3x + 2$	**f)** $x^2 - 2x - 8$
g) $x^2 + 2x + 1$	**h)** $2x^2 + 8x + 6$	**i)** $x^3 - 6x^2 + 11x - 6$
j) $x^3 - 5x^2 + 2x + 8$		

2. Solve the following equations:

a) $x^3 - 2x^2 - 11x + 12 = 0$	**b)** $\lvert 3x - 2 \rvert - 5 = 0$	**c)** $\sqrt{x^2 + 5} = 3x - 1$
d) $\sqrt{x + 4} + \sqrt{x - 1} = 3$	**e)** $x^4 - 5x^2 + 4 = 0$	**f)** $\lvert 2x^2 - 7 \rvert = 10$
g) $\dfrac{\sqrt{x}}{2} - \dfrac{3}{4} = \dfrac{x - 1}{2}$	**h)** $\sqrt{\dfrac{x}{2}} + \sqrt{\dfrac{x + 1}{3}} = 2$	

3. Sketch the following sets of reals:

   (a) The set A represented by the union of intervals $(-1, 2)$ and $[4, 6]$,

   (b) the set B represented by the intersection of intervals $[-3, 1]$ and $(-2, 5)$,

   (c) the set C represented by the union of intervals $(-3, 2)$ and $(4, \infty)$,

   (d) the set D represented by the intersection of intervals $(-\infty, -1)$ and $(0, 5]$,

   (e) the set E represented by the union of the interval $[1, 4]$ and the set of rational numbers in the open interval $(4, 6)$.

4. Find all $x \in \mathbb{R}$ satisfying the following inequalities:

a) $(x - 3)(2x + 5) > 0$	**d)** $\dfrac{x - 2}{x + 3} < 0$
b) $3x^2 - 4x < 5x - 2$	**e)** $\sqrt{2x - 1} > 3$
c) $-2x + 1 > 3$ $5x - 7 < 2x + 4$	**f)** $\dfrac{x^2 - 9}{x - 3} \leq 0$