

**Exercise. 1** Solve the following equations and inequalities.

a) $\frac{5-x}{5x} = \frac{2}{5+x}$ ,	b) $\frac{3x-1}{2x} = \frac{-3}{3x-1}$ ,	c) $\frac{2}{x-3} + \frac{4x}{x+2} = \frac{1}{3}$ ,
d) $1 + \frac{1}{x-1} = \frac{2}{x-2}$ ,	e) $\frac{2x+1}{x} + \frac{4x}{2x+1} = 5$ ,	f) $\frac{2x-2}{x^2-36} - \frac{x-2}{x^2-6x} = \frac{x-1}{x^2+6x}$ ,
g) $\frac{2}{x^2+x} - \frac{1}{x^2} = \frac{1}{6x}$ ,	h) $\frac{x+3}{x+2} - \frac{x-3}{x-2} = \frac{2x^2-4}{x^2-4}$ ,	i) $\frac{2}{x^2-3x+2} + \frac{5}{x^2-4} = \frac{2}{x^2-4x+4}$ ,
j) $\frac{x^2-4}{x^2-5x} > 0$ ,	k) $\frac{x^2-8x+6}{x^2+2} < 5$ ,	l) $\frac{x^2-5x+4}{4-x^2} \leq 0$ ,
m) $\frac{ 2x-5 }{ x+3 } \geq 1$ ,	n) $\frac{5}{x+3} - \frac{1}{x-1} \leq 1$ ,	o) $\frac{1}{x+2} \leq \frac{2}{x-3}$ ,
p) $\frac{1}{x^2-2x-15} > \frac{1}{x^2-x-2}$ ,	q) $\frac{ 2x-1 }{ x+2 } < 2$ ,	r) $\frac{1+x}{1+2x} - \frac{1-2x}{x+1} < -1$ ,
s) $\frac{x}{x-1} - \frac{2}{x+1} < \frac{8}{x^2-1}$ ,	t) $\frac{4}{x^2+5x} + \frac{x+1}{x+5} < \frac{2}{x}$ .	

**Exercise. 2** Solve the following equations.

a) $x^2 - 9 = 0$ ,	ą) $x^2 + 4 = 0$ ,	b) $x^2 - 3x = 0$ ,
c) $x^2 + 2x = 0$ ,	ć) $x^2 - 10x + 9 = 0$ ,	d) $2x^2 - 14x + 12 = 0$ ,
e) $x^2 + 2x + 3 = 0$ ,	ę) $x^2 - 4x + 4 = 0$ ,	f) $x^4 + 2x^2 - 3 = 0$ ,
g) $x^4 - 5x^2 + 4 = 0$ ,	h) $x^6 - 9x^3 + 8 = 0$ ,	i) $x^6 - 7x^2 + 6 = 0$ ,
j) $x - 3\sqrt{x} + 2 = 0$ ,	k) $x + 8\sqrt{x} + 7 = 0$ ,	l) $x - 4\sqrt{x+2} + 5 = 0$ ,
l) $x^4 + 5x^3 - x - 5 = 0$ ,	m) $x^3 - 4x^2 + x - 4 = 0$ ,	n) $x^5 + 7x^4 - 10x^3 - 70x^2 + 9x + 63 = 0$ ,
ń) $x^4 - 6x^3 + 8x - 48 = 0$ ,	o) $8x^4 - 4x^3 - 18x^2 + 9x = 0$ ,	ó) $24x^6 + 16x^5 + 3x^3 + 2x^2 = 0$ ,
p) $x^3 - 2x^2 - 5x + 6 = 0$ ,	r) $x^3 + 3x^2 - 4 = 0$ ,	s) $x^3 - 5x + 4 = 0$ ,
ś) $3x^3 + 6x^2 + 7x + 14 = 0$ ,	t) $x^3 + 4x^2 - 27x - 90 = 0$ ,	u) $x^4 - x^3 - 5x^2 + 3x + 6 = 0$ ,
w) $8x^3 + 12x^2 - 2x - 3 = 0$ ,	x) $6x^4 + x^3 - 20x^2 - 3x + 6 = 0$ ,	y) $x^6 + 2x^4 - 31x^2 + 28 = 0$ .

**Exercise. 3** Solve the following inequalities.

a) $(x-2)(x+3)(x-1) \leq 0$ ,	b) $x(3x-2)(3-x)(x+5) > 0$ ,
c) $x^2(x-3)^2(x+2)^5(x-1)^4 < 0$ ,	d) $x^{13}(x-4)^2(x^2-4)(x+1)^3 \geq 0$ ,
e) $(x^2-9)(x^2-3x-4) < 0$ ,	f) $(x-1)^2(x^2-5x+4)(x^2-8x+7) < 0$ ,
g) $x^3 + 2x^2 - 13x + 10 > 0$ ,	h) $x^3 - 21x - 20 < 0$ ,
i) $x^4 - 3x^3 + 8x - 24 \leq 0$ ,	j) $x^{10} - x^8 - 8x^7 + 8x^5 \geq 0$ .

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