

Polynomi

kerroin \downarrow $3 \leftarrow$ asteluku
 $-1 \cdot X \leftarrow$ muuttuja

asteluku 1

$$X = 1 \cdot X^1$$

1.1 a) $f(x) = -x^3 + 2x^2 + 3x + 4$

\uparrow nimi
 \uparrow termi
 \leftarrow Vakiotermi

3. asteen polynomi

muuttujan arvo on 2, eli $x=2$

$$-2^3 = -2 \cdot 2 \cdot 2$$

$$(-2)^3 = -2 \cdot (-2) \cdot (-2)$$

$$\begin{aligned}
 f(2) &= -2^3 + 2 \cdot 2^2 + 3 \cdot 2 + 4 \\
 &= -8 + 2 \cdot 4 + 3 \cdot 2 + 4 \\
 &= -8 + 8 + 6 + 4 \\
 &= 10
 \end{aligned}$$

b) $g(t) = 1 + 4t - 2t^2$

$$= -2t^2 + 4t + 1$$

2. asteen polynomi

$$\begin{aligned}
 g(2) &= -2 \cdot 2^2 + 4 \cdot 2 + 1 \\
 &= -8 + 8 + 1 = 1
 \end{aligned}$$

c) $h(x) = x^2 + ax + 3a$

$$\begin{aligned}
 h(2) &= 2^2 + a \cdot 2 + 3a \\
 &= 4 + 2a + 3a \\
 &= 5a + 4
 \end{aligned}$$

1.2

Sievenni:

a) $(4x - 1) + (2x - 5)$

$$\begin{aligned}
 &= 4x - 1 + 2x - 5 \\
 &= 6x - 6
 \end{aligned}$$

b) $(2x^2 - x) - (5x - 4x^2)$

$$\begin{aligned}
 &= \underline{2x^2} - \underline{x} - \underline{5x} + \underline{4x^2} \\
 &= 2x^2 - x - 5x + 4x^2
 \end{aligned}$$

$$-1 - 5 = -6$$

$$x^1 \cdot x^2 = x^{1+2} = x^3$$

$$= \frac{2x^2 - x}{6x^2 - 6x} \quad \frac{-5x + 4x^2}{-5x + 4x^2}$$

$$x^1 \cdot x^2 = x^{1+2} = x^3$$

$$\begin{aligned} \text{c) } & 4x \cdot (2x^2 - 3x) \\ &= 4x \cdot 2x^2 + 4x \cdot (-3x) \\ &= 8x^3 - 12x^2 \end{aligned}$$

$$\begin{aligned} x^1 \cdot x^2 &= x^3 \\ x \cdot x \cdot x & \end{aligned}$$

$$\begin{aligned} \text{d) } & (3x - 1) \cdot (4x - 3) \\ &= 12x^2 - 9x - 4x + 3 \\ &= 12x^2 - 13x + 3 \end{aligned}$$

1.8

Sievenni lausekkeet

$$\begin{aligned} \text{a) } & x - x \cdot (x+2) \cdot (2x+3) \\ &= x - x(2x^2 + 3x + 4x + 6) \\ &= x - x(2x^2 + 7x + 6) \\ &= x - 2x^3 - 7x^2 - 6x \\ &= -2x^3 - 7x^2 - 5x \end{aligned}$$

$$\begin{aligned} \text{b) } & (4x-1)^2 \\ &= (4x-1)(4x-1) \\ &= 16x^2 - 4x - 4x + 1 \\ &= 16x^2 - 8x + 1 \end{aligned}$$

1.9

$$\begin{aligned} \text{a) } & 2x^2 - (2x^2 - 3)(2x^2 + 3) \\ &= 2x^2 - (4x^4 + 6x^2 - 6x^2 - 9) \\ &= 2x^2 - (4x^4 - 9) \end{aligned}$$

$$\begin{aligned} &= 2x^2 - (4x^4 - 9) \\ &= 2x^2 - 4x^4 + 9 \\ &= -4x^4 + 2x^2 + 9 \end{aligned}$$

1.3
1.4
1.5

$$b) (x+1)^2 - (x+2)(x-2)$$

$$(x+1)(x+1)$$

$$= (x^2 + x + x + 1) - (x^2 - 2x + 2x - 4)$$

$$= x^2 + 2x + 1 - x^2 + 4$$

$$= 2x + 5$$