

$$(a+b)^2 =$$

5.42. Rozłóż na czynniki wielomiany, stosując wzór na różnicę kwadratów dwóch wyrażeń:

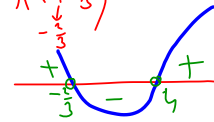
- a) $W(x) = (2x-1)^2 - (x+3)^2$ b) $W(x) = (6x-5)^2 - (3x+1)^2$
 c) $W(x) = (9x+7)^2 - (8x+1)^2$ d) $W(x) = (5x-3)^2 - (6x-1)^2$
 e) $W(x) = (4x+3)^2 - (5x-6)^2$ f) $W(x) = (2x-7)^2 - (5x+2)^2$
 g) $W(x) = (x-6)^2 - (2x+1)^2$ h) $W(x) = (10x+3)^2 - (9x-7)^2$

$$a^2 - b^2 = (a-b)(a+b)$$

$$a) \underbrace{(2x-1)^2}_a - \underbrace{(x+3)^2}_b = [(2x-1) - (x+3)][(2x-1) + (x+3)]$$

$$= (x-4)(3x+2) = 3(x-4)(x+\frac{2}{3})$$

$$a_c = 3 > 0$$



$$W(x) > 0 \Leftrightarrow x \in (-\infty, -\frac{2}{3}) \cup (4, +\infty)$$

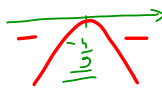
5.43. Rozłóż na czynniki wielomiany, stosując wzory na kwadrat sumy oraz na kwadrat różnicy dwóch wyrażeń:

$$h) W(x) = -81x^2 - 72x - 16 = -(81x^2 + 72x + 16) =$$

$$-(9x+4)^2 = -81(x+\frac{4}{9})^2$$

$$W(x) \geq 0 \Leftrightarrow x \in \{-\frac{4}{9}\}$$

$$-81(x+\frac{4}{9})(x+\frac{4}{9})$$



$$h) W(x) = 6x^4 - 4x^3 - 10x^2 = 2x^2(3x^2 - 2x - 5)$$

$$W(x) = 6x^2(x+1)(x-\frac{5}{3})$$

$$W(x) \geq 0 \Leftrightarrow x \in (-\infty, -1) \cup (\frac{5}{3}, +\infty) \cup \{0\}$$

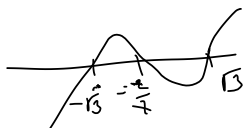


5.48. Rozłóż na czynniki wielomiany metodą grupowania wyrażeń:

$$b) W(x) = 7x^3 + 2x^2 - 21x - 6 =$$

$$7x^3 - 21x + 2x^2 - 6 = 7x(x^2 - 3) + 2(x^2 - 3) =$$

$$(x^2 - 3)(7x + 2) = 7(x-\sqrt{3})(x+\sqrt{3})(x+\frac{2}{7})$$

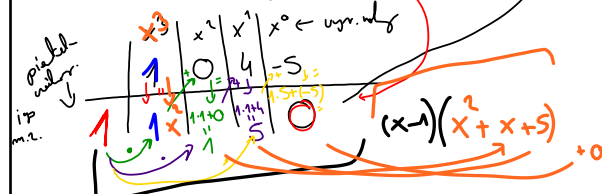


$$W(x) < 0 \Leftrightarrow x \in (-\infty, -\sqrt{3}) \cup (-\frac{2}{7}, \sqrt{3})$$

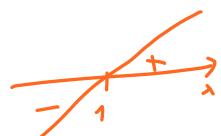
$$d) W(x) = x^3 + 4x - 5$$

$$W(1) = 1^3 + 4 \cdot 1 - 5 = 5 - 5 = 0$$

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$$W(x) = (x-1)(x^2+x+5)$$



5.53. Rozłóż na czynniki wielomiany:

a) $W(x) = 15x^3 - 35x^2 + 6x - 14$

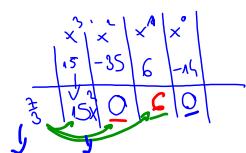
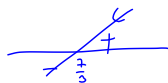
c) $W(x) = 4x^3 - 4x^2 + 1$

e) $W(x) = 3x^3 + 3x^2 - 18x$

g) $W(x) = 2x^3 + 5x^2 - 3x$

$$15x^3 - 35x^2 + 6x - 14 = 5x^2(3x-7) + 2(3x-7)$$

$$= (5x^2+2)(3x-7) = 15\left(x^2+\frac{2}{3}\right)\left(x-\frac{7}{3}\right)$$



$\frac{7}{3} \cdot 15 = 35$

$\frac{7}{3} \cdot -35 = -35$

$\frac{7}{3} \cdot 6 = 14$

$\frac{7}{3} \cdot -14 = -14$

$$\left(x - \frac{7}{3}\right)(15x^2 + 6) = 15\left(x - \frac{7}{3}\right)\left(x^2 + \frac{2}{3}\right) = 0$$

$5, 6^2 - 67$

