

## Lista II.

## Działania na wyrażeniach algebraicznych

Wyznacz  $b$  z podanych równań:

1.1.  $ba + a^2 = 1 + b.$

1.3.  $a - b = \frac{b-1}{a}.$

1.2.  $a = \frac{b-1}{b+a}.$

1.4.  $\frac{a^2 + ab}{b} = 3.$

Doprowadź do możliwie najprostszej postaci wyrażenia:

1.5.  $\frac{x^2 + y^2}{x^2 - y^2} - \frac{x + y}{2x - 2y} + 1.$

1.6.  $\frac{3x + 2}{x^2 - 2x + 1} - \frac{6}{x^2 - 1} + \frac{3x - 2}{x^2 + 2x + 1}.$

1.7.  $\frac{a^4 - x^4}{a^3 - x^3} : \frac{a^2 + x^2}{a^2 - x^2}.$

1.8.  $\frac{1}{a-b} - \frac{3ab}{a^3 - b^3} - \frac{b-a}{a^2 + ab + b^2}.$

1.9.  $\frac{ab + bc + ac + c^2}{ab - ac - bc + c^2} : \frac{b^2 - c^2}{a^2 - c^2}.$

1.10.  $\frac{ax + ay}{x^2 - 2xy + y^2} \cdot \frac{2x + 2y}{ax^2 + 2axy + ay^2}.$

1.11.  $\left( \frac{3(x-y)}{x^{\frac{2}{3}} + x^{\frac{1}{6}} \cdot y^{\frac{1}{2}}} - \frac{x^{\frac{5}{6}} - x^{-\frac{1}{6}}y}{x^{\frac{1}{2}} + y^{\frac{1}{2}}} \right) \cdot x^{\frac{1}{6}}.$

1.12.  $\left( \frac{a^{1,5} - b^{1,5}}{a-b} - \frac{a-b}{a^{0,5} - b^{0,5}} \right) \cdot (a^{\frac{1}{2}} + b^{\frac{1}{2}}).$

1.13.  $\left( \frac{5a}{a+x} + \frac{5x}{a-x} + \frac{10ax}{a^2 - x^2} \right) : \left( \frac{a}{a+x} + \frac{x}{a-x} - \frac{2ax}{a^2 - x^2} \right).$

1.14.  $\left( \frac{a^2 - ab}{a^2b + b^3} - \frac{2a^2}{b^3 - ab^2 + ab^2 - a^3} \right) \cdot \left( 1 - \frac{b-1}{a} - \frac{b}{a^2} \right).$

1.15.  $\left( \frac{(\sqrt{a} + 1)^3 - a\sqrt{a} + 2}{(\sqrt{a} + 1)^2 - \frac{a - \sqrt{ab}}{\sqrt{a} - \sqrt{b}}} \right)^{-1}.$

1.16.  $\frac{a^2 + a - 2}{a^{n+1} - 3a^n} \left[ \frac{(a+2)^2 - a^2}{4a^2 - 4} - \frac{3}{a^2 - a} \right], \quad n \in \mathbb{N}.$

1.17.  $\frac{n+2 + \sqrt{n^2 - 4}}{n+2 - \sqrt{n^2 - 4}} + \frac{n+2 - \sqrt{n^2 - 4}}{n+2 + \sqrt{n^2 - 4}}.$

1.18.  $\left( \frac{m + \sqrt{m^2 - n^2}}{m - \sqrt{m^2 - n^2}} - \frac{m - \sqrt{m^2 - n^2}}{m + \sqrt{m^2 - n^2}} \right) : \frac{4m\sqrt{m^2 - n^2}}{n^2}.$

$$1.19. \frac{a^{-1} + b^{-1} + 2(\sqrt{a} + \sqrt{b})^{-1}(a^{-\frac{1}{2}} + b^{-\frac{1}{2}})}{\left(\frac{ab - a\sqrt{ab}}{a + \sqrt{ab}}\right)^{-1}}.$$

$$1.20. \left(\sqrt{a} + \frac{ab^2 + c}{\sqrt{ab^2 + c}}\right) : (b\sqrt{a} + b\sqrt{ab^2 + c}).$$

$$1.21. \frac{\sqrt{x} + 1}{x\sqrt{x} + x + \sqrt{x}} : \frac{1}{x^2 - \sqrt{x}}.$$

$$1.22. \left((\sqrt[4]{p} - \sqrt[4]{q})^{-2} + (\sqrt[4]{p} + \sqrt[4]{q})^{-2}\right) : \frac{\sqrt{p} + \sqrt{q}}{p - q}.$$

$$1.23. \frac{\left(\sqrt{a^2 + a\sqrt{a^2 - b^2}} - \sqrt{a^2 - a\sqrt{a^2 - b^2}}\right)^2}{2\sqrt{a^3b}} : \left(\sqrt{\frac{a}{b}} + \sqrt{\frac{b}{a}} - 2\right).$$

$$1.24. \left(\frac{(a+b)^{-\frac{n}{4}} \cdot c^{\frac{1}{2}}}{a^{2-n}b^{-\frac{3}{4}}}\right)^{\frac{4}{3}} : \left(\frac{b^3c^4}{(a+b)^{2n}a^{16-8n}}\right)^{\frac{1}{6}}, \quad a = \frac{19}{31}, b = 0,04, c = 6\frac{8}{15}.$$

$$1.25. \frac{2x^{-\frac{1}{3}}}{x^{\frac{2}{3}} - 3x^{-\frac{1}{3}}} - \frac{x^{\frac{2}{3}}}{x^{\frac{5}{3}} - x^{\frac{2}{3}}} - \frac{x+1}{x^2 - 4x + 3}.$$

$$1.26. \frac{(\sqrt{a} + \sqrt{b})^2 - 4b}{(a-b) : \left(\sqrt{\frac{1}{b}} + 3\sqrt{\frac{1}{a}}\right)} : \frac{a + 9b + 6\sqrt{ab}}{\frac{1}{\sqrt{b}} + \frac{1}{\sqrt{a}}}.$$

$$1.27. \frac{(\sqrt[4]{m} + \sqrt[4]{n})^2 + (\sqrt[4]{m} - \sqrt[4]{n})^2}{2(m-n)} : \frac{1}{\sqrt{m^3} - \sqrt{n^3}} - 3\sqrt{mn}.$$

$$1.28. \left[\left(\frac{2^{\frac{3}{2}} + 27y^{\frac{3}{5}}}{\sqrt{2} + 3\sqrt[5]{y}} + 3\sqrt[10]{32y^2} - 2\right) \cdot 3^{-2}\right]^5.$$

Sprawdź następujące równości:

$$1.29. 4 : \left(0, 6\sqrt[3]{\frac{1}{3}}\right) = 10\sqrt[4]{1,5} : \left(0, 25\sqrt[4]{216\sqrt[3]{9}}\right).$$

$$1.30. \frac{\sqrt{2} - 1}{\sqrt{2} + 1} = \sqrt[3]{\frac{10 - 7\sqrt{2}}{10 + 7\sqrt{2}}}.$$