

Usuń niewymierność z mianownika

$$(1) \quad \frac{1}{\sqrt{2}}$$

$$(2) \quad \frac{1}{\sqrt{3}}$$

$$(3) \quad \frac{1}{\sqrt{7}}$$

$$(4) \quad \frac{1}{\sqrt{4}}$$

$$(5) \quad \frac{\sqrt{2}}{\sqrt{3}}$$

$$(6) \quad \frac{\sqrt{2}+1}{\sqrt{5}}$$

$$(7) \quad \frac{\sqrt{2}+\sqrt{3}}{\sqrt{7}}$$

$$(8) \quad \frac{\sqrt{7}-2}{\sqrt{2}}$$

$$(9) \quad \frac{2-\sqrt{11}}{\sqrt{3}}$$

$$(10) \quad \frac{3\sqrt{3}}{\sqrt{2}}$$

$$(11) \quad \frac{3\sqrt{7}-2\sqrt{2}}{3\sqrt{2}}$$

$$(12) \quad \frac{-\sqrt{7}-1}{-\sqrt{2}}$$

$$(13) \quad \frac{1}{\sqrt{2}+1}$$

$$(14) \quad \frac{1}{\sqrt{2}-1}$$

$$(15) \quad \frac{\sqrt{2}}{\sqrt{5}-1}$$

$$(16) \quad \frac{3\sqrt{2}}{\sqrt{7}+3}$$

$$(17) \quad \frac{2\sqrt{3}-4}{1-\sqrt{2}}$$

$$(18) \quad \frac{\frac{1}{2}+\sqrt{2}}{\sqrt{2}-2}$$

$$(19) \quad \frac{\sqrt{2}-\sqrt{3}}{\sqrt{5}-\sqrt{7}}$$

$$(20) \quad \frac{\sqrt{3}-3\sqrt{2}}{\sqrt{7}+2\sqrt{3}}$$

Oblicz

$$(21) \quad \left( \frac{3 + \sqrt{2}}{2} \right)^2$$

$$(22) \quad \left( \frac{1 + \sqrt{3}}{\sqrt{2}} \right)^2$$

$$(23) \quad 3 \cdot \sqrt[3]{27} + 3$$

$$(24) \quad \frac{1}{8} \left( 4 - \frac{\sqrt{2}}{3} \right)^2$$

$$(25) \quad - \left[ \sqrt{2} - \sqrt{3} \cdot (\sqrt{6} - 1) \right]$$

$$(26) \quad (\sqrt{2} + \sqrt{3})(\sqrt{2} - \sqrt{3})$$

$$(27) \quad \left( 3 \cdot 3^{\frac{1}{2}} + 3^{\frac{1}{3}} \right) \cdot \sqrt{3}$$

$$(28) \quad \sqrt[7]{3} \cdot 3^{\frac{1}{7}} \cdot \left( \sqrt{3} \cdot \sqrt{2} - \sqrt{6} \right)$$

$$(29) \quad 3^7 \cdot 3^{-7} \cdot 3^3$$

$$(30) \quad 2^5 \cdot 2^{-4} - 4^7 : 4^6$$

$$(31) \quad 2^7 \cdot 4^{-3} + 3^{14} : \left( \frac{1}{3} \right)^{-15}$$

$$(32) \quad 1 - \frac{1}{3^2} + 3 \cdot \sqrt{3} \cdot 3^{\frac{1}{2}}$$

$$(33) \quad \frac{-2 + 16^{-\frac{1}{2}}}{\sqrt{2}}$$

$$(34) \quad \frac{3^{13}}{9^5} \cdot 9$$

$$(35) \quad \frac{2 \cdot 2^7 : \left( \frac{1}{4} \right)^{-2}}{2^7}$$

$$(36) \quad \frac{\sqrt[3]{9} \cdot 3^{-2} \cdot \sqrt[4]{3}}{3}$$

Narysuj wykres funkcji

$$(37) \quad y = x$$

$$(38) \quad y = 2x$$

$$(39) \quad y = 3x$$

$$(40) \quad y = \frac{1}{2}x$$

$$(41) \quad y = \frac{1}{3}x$$

$$(42) \quad y = x + 1$$

$$(43) \quad y = x + 2$$

$$(44) \quad y = x - 2$$

$$(45) \quad y = 2x - 1$$

$$(46) \quad y = 3x - 2$$

$$(47) \quad f(x) = 2 - x$$

$$(48) \quad f(x) = \frac{1}{2}x - 2$$

$$(49) \quad y = 2x - 4$$

$$(50) \quad y = -x$$

$$(51) \quad y = -2x$$

$$(52) \quad y = -3x - 2$$

$$(53) \quad y = -\frac{1}{2}x - 4$$

$$(54) \quad y = 2$$

$$(55) \quad g(t) = 3t + 1$$

$$(56) \quad x \mapsto x - 2$$

$$(57) \quad t \mapsto -2 - 2t$$

$$(58) \quad f(x) = 0$$

$$(59) \quad 2y = 4x - 2$$

$$(60) \quad y = x \cdot \sqrt{2} - 1$$

Rozwiąż równanie

$$(61) \quad -3x = 4 - 2 \cdot (3x + 2)$$

$$(62) \quad x^2 - 2x = 4 + (x + 1)^2$$

$$(63) \quad x - (1 - 2x) = 3$$

$$(64) \quad x - (2x + 1)^2 = -x - 4x^2 + 3$$

$$(65) \quad 4x + 1 = 3x - \sqrt{2}$$

$$(66) \quad 1 - 3x = 3\sqrt{2} \cdot x - 3$$

$$(67) \quad 2 - \frac{1}{2}(x + 7) = \frac{3 - x}{2}$$

$$(68) \quad \frac{2 - x}{3} + \frac{x - 4}{2} = 1$$

$$(69) \quad (x + 4)(x + 3) = x^2 - 7$$

$$(70) \quad \frac{4x - 2}{2} - \frac{3x - 3}{3} = 4 - x$$

$$(71) \quad \frac{2x + 7}{3} = \frac{4x - 1}{5}$$

$$(72) \quad \frac{7 - 3t}{2} - t + 4 = 3t - 1$$

$$(73) \quad x(x - 3) - x^2 = 0$$

$$(74) \quad (x + 4)(3 - x) = -x^2 - (2x + 1)$$

$$(75) \quad \frac{\sqrt{3}}{3} \cdot x(x - 3) = \frac{x(6x - 1)}{6\sqrt{3}}$$

$$(76) \quad \frac{x}{\sqrt[3]{2}} \cdot 2^{\frac{4}{3}} = \frac{4^3}{2^{2\frac{1}{2}}} - 2x$$

Zaznacz na osi liczbowej

$$(77) \quad x \in (1, 3)$$

$$(78) \quad x \in (1, 3\rangle$$

$$(79) \quad x \in \langle 1, 3\rangle$$

$$(80) \quad x \in (-\infty, 1\rangle$$

$$(81) \quad x \in (-\infty, \frac{3}{2})$$

$$(82) \quad x \in (1, 3\rangle \cup \langle 5, 10)$$

$$(83) \quad x \in (-1, 1) \cup (2, \infty)$$

$$(84) \quad x \in (-\infty, -1\rangle \cup \langle 1, \infty)$$

$$(85) \quad x \in (-\infty, 1) \cup (1, \infty)$$

$$(86) \quad x \in \langle 1, 5\rangle \cap \langle 2, 10\rangle$$

$$(87) \quad x \in (-7, 1) \cap (-1, 3)$$

$$(88) \quad x \in (-\infty, 5\rangle \cup (2, 7)$$

$$(89) \quad x \in (-3, 1\rangle \cup (1, \infty)$$

$$(90) \quad x \in (-\infty, 3) \cap \langle 1, \infty)$$

$$(91) \quad x \in (-7, 1) \cap (5, \infty)$$

$$(92) \quad x \in (0, 4) \cup \{6\}$$

$$(93) \quad x \in (-1, 1) \cap \{0\}$$

$$(94) \quad x \in (-7, 7) \setminus \langle 0, 10\rangle$$

Rozwiąż nierówność

$$(95) \quad 2x - 6 \leq x$$

$$(96) \quad x - \frac{1}{2} \leq \frac{3}{4} - x$$

$$(97) \quad -3x - (3 - x) \geq -x + 3$$

$$(98) \quad 3x - \frac{x - 2}{2} \leq x$$

$$(99) \quad \frac{x + 3}{3} + \frac{x + 2}{2} < 0$$

$$(100) \quad \frac{2x - 3}{4} > \frac{x + 2}{2}$$

$$(101) \quad \frac{2x - 3}{4} \geq -\frac{-x - 2}{2}$$

$$(102) \quad -\frac{3 - x}{2} \geq \frac{2x - 1}{4}$$

$$(103) \quad x + \frac{-2x + 3}{4} \leq -2 \cdot \frac{2 + x}{2}$$

$$(104) \quad |x - 1| < 3$$

$$(105) \quad |x + 7| \leq 3$$

$$(106) \quad 3 - |x + 1| < 0$$

$$(107) \quad |2x - 1| \geq 3$$

$$(108) \quad |x| < 0$$

$$(109) \quad 3 \cdot |1 - x| > 1$$

$$(110) \quad 3 < |x - 3|$$

Rozwiąż równanie

$$(111) \quad x^2 - 3x + 2 = 0$$

$$(112) \quad x^2 - 2x + 1 = 0$$

$$(113) \quad 2x^2 - 5x + 2 = 0$$

$$(114) \quad x^2 - 8x + 15 = 0$$

$$(115) \quad x^2 + 2x + 1 = 0$$

$$(116) \quad x^2 + 3x + 2 = 0$$

$$(117) \quad x^2 - 6x + 9 = 0$$

$$(118) \quad 2x^2 - 2x = 0$$

$$(119) \quad 9x + 3x^2 - 12 = 0$$

$$(120) \quad 2x(x - 4) = 0$$

$$(121) \quad (x - 3)(x + 4) = 0$$

$$(122) \quad 2x^2 + 18 = 12x$$

$$(123) \quad -5x + 2x^2 = -3$$

$$(124) \quad \frac{-x^2 + x}{2} + x = 3$$

$$(125) \quad \frac{x - 3}{x} - x + 4 = 0$$

$$(126) \quad \frac{x - 1}{x + 1} = \frac{x - 2}{x + 2}$$

Rozwiąż nierówność

$$(127) \quad x^2 - 1 > 0$$

$$(128) \quad 2 + x^2 - 3x > 0$$

$$(129) \quad x^2 + 6 \leq 5x$$

$$(130) \quad x^2 + x - 2 < 2$$

$$(131) \quad x^2 + 2x + 3 \geq 0$$

$$(132) \quad x(x - 3) < 0$$

$$(133) \quad -2x^2 + 2x - 7 > 0$$

$$(134) \quad 2x^2 - 4x - 6 < 0$$

$$(135) \quad x^2 - 2x + 2 > 0$$

$$(136) \quad x^2 + 4x + 4 \leq 0$$

$$(137) \quad 3x^2 - 8x + 5 < 0$$

$$(138) \quad 2(x - 3)(x + 2) \leq 0$$

$$(139) \quad 3x^2 - x + 2 \geq 0$$

$$(140) \quad -x^2 - x - 2 \leq 0$$

$$(141) \quad \frac{(x-1)^2}{3} - (x-1) \geq 0$$

$$(142) \quad \frac{(x-1)^2}{2} + \left(\frac{x-4}{2}\right)^2 \leq 0$$



Rozwiąż równanie

$$(143) \quad x^3 - x^2 - x + 1 = 0$$

$$(144) \quad x^3 - 2x^2 - x - 2 = 0$$

$$(145) \quad x^3 - 2x^2 - x + 2 = 0$$

$$(146) \quad x^3 + x^2 - 9x - 9 = 0$$

$$(147) \quad -4x^3 + 4x^2 + 4x - 4 = 0$$

$$(148) \quad 16x^3 - 4x^2 - 4x + 1 = 0$$

$$(149) \quad 3x^3 - 6x^2 - 48x + 96 = 0$$

$$(150) \quad x^3 + 3x^2 - 9x - 27 = 0$$

$$(151) \quad x^3 - 2x^2 - 3x + 6 = 0$$

$$(152) \quad 2x^3 - 8x^2 - 8x + 32 = 0$$

$$(153) \quad x^3 - x^2 - x - 1 = 0$$

$$(154) \quad x^3 + x^2 + x + 1 = 0$$

$$(155) \quad x^3 - 2x^2 + 4x - 8 = 0$$

$$(156) \quad 4x^3 + 2x^2 - 2x - 1 = 0$$

$$(157) \quad x^3 - 7x^2 - 7x + 49 = 0$$

$$(158) \quad 3x^3 - x = 0$$

Znajdź różnicę  $r$  oraz  $n$ -ty wyraz ciągu arytmetycznego  $a_n$  mając dane

$$(159) \quad a_2 = 3, a_6 = 11, n = 4$$

$$(160) \quad a_3 = 1, a_7 = 9, n = 1$$

$$(161) \quad a_4 = 3, a_9 = 9, n = 5$$

$$(162) \quad a_1 = 30, a_8 = 90, n = 3$$

$$(163) \quad a_7 = 21, a_{14} = 3, n = 5$$

$$(164) \quad a_{14} = 60, a_{19} = 35, n = 10$$

$$(165) \quad a_2 = 3, a_7 = -12, n = 5$$

$$(166) \quad a_{13} = 100, a_{17} = 90, n = 10$$

Znajdź  $n$ -ty wyraz ciągu arytmetycznego  $a_n$  mając dane

$$(167) \quad a_2 = 3, r = 11, n = 4$$

$$(168) \quad a_6 = 1, r = 9, n = 1$$

$$(169) \quad a_4 = 3, r = 4, n = 10$$

$$(170) \quad a_1 = 32, r = \frac{1}{2}, n = 7$$

$$(171) \quad a_7 = -10, r = 3, n = 4$$

$$(172) \quad a_{11} = 60, r = \frac{3}{4}, n = 16$$

$$(173) \quad a_3 = -\frac{2}{3}, r = 3, n = 9$$

$$(174) \quad a_{12} = -60, r = -15, n = 18$$

Znajdź iloraz  $q$  oraz  $n$ -ty wyraz ciągu geometrycznego  $a_n$  mając dane

$$(175) \quad a_2 = 3, a_6 = 48, n = 8$$

$$(176) \quad a_3 = 2, a_18 = 9, n = 2$$

$$(177) \quad a_4 = 8, a_7 = 27, n = 10$$

$$(178) \quad 237a_1 = 60, a_4 = 7\frac{1}{2}, n = 5$$

$$(179) \quad a_7 = 21, a_{10} = \frac{7}{9}, n = 5$$

$$(180) \quad a_{10} = 600, a_{13} = 2229, n = 8$$

$$(181) \quad a_2 = 4, a_6 = 128, n = 9$$

$$(182) \quad a_2 = 1, a_5 = 16, n = 7$$