

str / nal	Linea: Matematika za 1. letnik gimnazije - Potence s celimi eksponenti
L90 / 332	<p>Zapišite kot celo število ali z ulomkom:</p> <p>a) $5^2, 5^{-1}, 2^3, 2^{-3}, 4^{-2}, 17^0$ b) $(-1)^3, (-3)^2, (-4)^{-1}, (-5)^3, (-5)^{-3}, -2^{-4}, (-11)^0, -4^5$ c) $10^3, 10^{-1}, 10^{-2}, 10^{-3}, (-10)^{-2}, (-10)^{-5}$</p> <p>$(-1)^n = \pm 1$, če je eksponent sodo število (pozitivno ali negativno), je rezultat +1, pri lihem eksponentu pa -1.</p> <p>a) $5^2 = 25, 5^{-1} = \frac{1}{5}, 2^3 = 8, 2^{-3} = \frac{1}{8}, 4^{-2} = \frac{1}{16}, 17^0 = 1$</p> <p>b) $(-1)^3 = -1, (-3)^2 = 9, (-4)^{-1} = -\frac{1}{4}, (-5)^3 = -125, (-5)^{-3} = -\frac{1}{125}, -2^{-4} = -\frac{1}{16}, (-11)^0 = 1, -4^5 = -1024$</p> <p>c) $10^3 = 1000, 10^{-1} = \frac{1}{10}, 10^{-2} = \frac{1}{100}, 10^{-3} = \frac{1}{1000}, (-10)^{-2} = \frac{1}{100}, (-10)^{-5} = -\frac{1}{10000}$</p>
L90 / 333	<p>Števila $32, 81, \frac{1}{9}, \frac{1}{27}, -216, -\frac{1}{16}, \frac{32}{243}$ zapišite kot potence.</p> <p>$32 = 2^5, 81 = 9^2 = 3^4, \frac{1}{9} = 9^{-1} = 3^{-2}, \frac{1}{27} = 3^{-3}, -216 = -6 \cdot 36 = -6^3 = (-6)^3, -\frac{1}{16} = -16^{-1} = -4^{-2} = -2^{-4}, \frac{32}{243} = \frac{2^5}{9 \cdot 27} = \frac{2^5}{3^5} = \left(\frac{2}{3}\right)^5$</p>
L90 / 334	<p>Števila $100, 1000000, \frac{1}{10}, -\frac{1}{100}, 1, -10000, -\frac{1}{1000}$ zapišite kot potence števila 10.</p> <p>$100 = 10^2, 1000000 = 10^6, \frac{1}{10} = 10^{-1}, -\frac{1}{100} = -10^{-2}, 1 = 10^0, -10000 = -10^4, -\frac{1}{1000} = (-10)^{-3} = -10^{-3}$</p>
L90 / 335	<p>Zapišite kot celo število ali z ulomkom (pomagajte si z žepnim računalom): $3^9, 10^8, 10^{-7}, 4^{-6}, 5^{-7}, (-6)^{-4}, (-9)^{-5}$.</p> <p>$3^9 = 19683, 10^8 = 100000000, 10^{-7} = \frac{1}{10000000}, 4^{-6} = \frac{1}{4096}, 5^{-7} = \frac{1}{78125}, (-6)^{-4} = +\frac{1}{1296}, (-9)^{-5} = -\frac{1}{59049}$.</p>
L90 / 336	<p>Števila $3^{-2}, 4^1, (-2)^3, -3^2, (-4)^2, (-5)^{-1}$ uredite po velikosti od manjšega k večjemu.</p> <p>Negativna števila so manjša od pozitivnih. Negativna so tista, kjer je predznak minus, ali pa z lihim eksponentom, če je minus v oklepaju. Taka so števila z zaporednimi številkami 3, 4 in 6.</p> <p>Nadalje so števila z negativnim eksponentom vedno med 0 in 1, oziroma med -1 in 0.</p> <p>Še najlažje jih torej razvrstimo, če jih zapišemo kot ulomke: $3^{-2} = \frac{1}{9}, 4^1 = 4, (-2)^3 = -8, -3^2 = -9, (-4)^2 = 16, (-5)^{-1} = -\frac{1}{5}$.</p> <p>Po velikosti si sledijo: <u>$-3^2 < (-2)^3 < (-5)^{-1} < 3^{-2} < 4^1 < (-4)^2$</u>.</p>
L90 / 337	<p>Števila $(-2)^7, (-1)^8, (-3)^3, -10^2, (-3)^{-2}, 10^3, (-2)^5, 3^7, (-113)^0, (-2)^{-4}, 3^4, (-10)^5$ uredite po velikosti.</p> <p>Najprej jih izračunamo – pretvorimo v ulomke (racionalna števila): $(-2)^7 = -128, (-1)^8 = 1, (-3)^3 = -27, -10^2 = -100, (-3)^{-2} = \frac{1}{9}, 10^3 = 1000, (-2)^5 = -32, 3^7 = 2187, (-113)^0 = 1, (-2)^{-4} = \frac{1}{16}, 3^4 = 81, (-10)^5 = -100000$.</p> <p>Po velikosti si torej sledijo: <u>$(-10)^5 < (-2)^7 < -10^2 < (-2)^5 < (-3)^3 < (-2)^{-4} < (-3)^{-2} < (-1)^8 = (-113)^0 < 3^4 < 10^3 < 3^7$</u>.</p>
L91 / 338	<p>Izračunajte:</p> <p>a) $2^3 \cdot 2^{-6} = 2^{3-6} = 2^{-3} = \frac{1}{8}$ g) $x^{-4} : x^5 = x^{-4-5} = x^{-9} = \frac{1}{x^9}$</p> <p>b) $3^{-3} : 3^4 = 3^{-3-4} = 3^{-7} = \frac{1}{3^7} = \frac{1}{2187}$ h) $z^3 : z^{-2} = z^{3-(-2)} = z^5$</p> <p>c) $\left(\frac{3}{4}\right)^2 \cdot 3^{-2} = \frac{3^2}{4^2} \cdot \frac{1}{3^2} = \frac{1}{16}$ i) $(a^5)^{-2} \cdot (a^{-3})^4 = a^{-10} \cdot a^{-12} = a^{-22} = \frac{1}{a^{22}}$</p> <p>č) $\left(\frac{2}{5}\right)^{-3} : 5^6 = \left(\frac{5}{2}\right)^3 \cdot \frac{1}{5^6} = \frac{5^3}{2^3 \cdot 5^6} = \frac{1}{2^3 \cdot 5^3} = \frac{1}{(2 \cdot 5)^3} = \frac{1}{1000}$ j) $(a^{-3})^{-4} : (a^2)^{-1} = a^{12} : a^{-2} = a^{12+2} = a^{14}$</p> <p>d) $\left(\frac{4}{3}\right)^{-4} : \left(\frac{1}{6}\right)^{-3} = \left(\frac{3}{4}\right)^4 : 6^3 = \frac{3^4}{4^4 \cdot 6^3} = \frac{3^4}{2^8 \cdot 2^3 \cdot 3^3} = \frac{3}{2^{11}} = \frac{3}{2048}$ ali $a^{-3} b^{-6} \cdot (a^3 b)^2 = a^{-3} b^{-6} a^6 b^2 = a^3 b^{-4} = \frac{a^3}{b^4}$ k) $(ab^2)^{-3} : (a^3 b)^{-2} = \frac{a^{-3} b^{-6}}{a^{-6} b^{-2}} \xrightarrow{\text{obrnemo}} \frac{a^6 b^2}{a^3 b^6} = \frac{a^3}{b^4}$</p> <p>e) $(2^{-3})^2 \cdot \frac{1}{4} = 2^{-6} \cdot 2^{-2} = 2^{-8} = \frac{1}{256}$ ali $\frac{1}{8^2} \cdot \frac{1}{4} = \frac{1}{256}$ l) $(2x)^{-5} \cdot (3x)^2 = 2^{-5} x^{-5} \cdot 3^2 x^2 = \frac{3^2 x^{-3}}{2^5} = \frac{9}{32x^3}$</p> <p>f) $\frac{(3^{-2})^{-4}}{32 \cdot \left(\frac{1}{2}\right)^{-3}} = \frac{3^8}{2^5 \cdot (2^{-1})^{-3}} = \frac{3^8}{2^5 \cdot 2^3} = \frac{3^8}{2^8} = \left(\frac{3}{2}\right)^8$ m) $(4x^2)^{-3} : (2^{-2} x)^4 = 4^{-3} x^{-6} \cdot (2^{-2} x)^4 = 2^{-6} x^{-6} 2^8 x^4 = \frac{4}{x^{10}}$</p>

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L91 / 339	<p>Poenostavite izraze.</p> <p>a) $(2a^{-3}b^2) \cdot (2^{-2}a^4b^1) = 2a^{-3}b^2 \cdot 2^{-2}a^4b = 2^{-1}ab^3 = \frac{1}{2}ab^3$</p> <p>b) $(3^{-2}x^2y^{-3}) \cdot (3^3x^{-2}y^4) = 3x^0y = 3y$</p> <p>c) $(a^2b^{-2}) \cdot (a^{-1}b^2) \cdot (a^2b^3) = a^{2-1+2}b^{-2+2+3} = a^3b^3 = (ab)^3$</p>	<p>č) $(4^{-1}a^3b^4) \cdot (4a^2b^{-2})^2 = 4^{-1}a^3b^4 \cdot 4^2a^4b^{-4} = 4a^7b^0 = 4a^7$</p> <p>d) $((-2)^{-3}x^3y^{-2})^2 \cdot ((-2)^4x^2y)^1 = (-2)^6x^6y^4 \cdot (-2)^4x^2y^{-1} = (-2)^{10}x^8y^3 = \frac{4y^3}{x^8}$</p> <p>e) $((-3)^{-1}x^2y^{-2})^3 \cdot (9xy^{-1})^2 = (-3)^{-3}x^6y^{-6} \cdot 9^2x^2y^{-2} = -3^{-3}3^4x^8y^{-8} = -3\left(\frac{x}{y}\right)^8$</p>
L91 / 340	<p>Poenostavite izraze.</p> <p>a) $(5ab^{-2}) : (5^2a^{-3}b^2) = 5^{1-2}a^{1-(-3)}b^{-2-2} = 5^{-1}a^4b^{-4} = \frac{1}{5}\left(\frac{a}{b}\right)^4$</p> <p>b) $\frac{4x^2y^{-3}}{2^{-2}x^{-1}y^4} = \frac{2^2x^22^2x}{y^4y^3} = \frac{16x^3}{y^7}$</p> <p>c) $(ab^{-1}) \cdot (a^2b^3) : (a^2b^{-1}) = a^{1+2-2}b^{-1+3+1} = ab^3$</p> <p>č) $(4^{-1}a^2b^{-2}) : ((-2)^4ab)^2 = 2^{-2}a^2b^{-2} : 2^8a^2b^2 = 2^{-10}a^0b^{-4} = \frac{1}{1024b^4}$</p>	<p>d) $\frac{2x^3(-y)^{-2}}{(2^2x^{-1}y^1)^2} = \frac{2x^3y^{-2}}{2^4x^{-2}y^2} = 2^{1-4}x^{3-(-2)}y^{-2-2} = 2^{-3}x^5y^{-4} = \frac{x^5}{8y^4}$</p> <p>e) $(x^2y^{-2})^3 \cdot ((-x)^3(-y)^{-3})^2 = x^{-6}y^6 \cdot ((-1)x^3(-1)y^{-3})^2 = x^{-6}y^6 \cdot (x^3y^{-3})^2 = x^{-6}y^6 \cdot x^6y^{-6} = x^{-6+6}y^{6-6} = x^0y^0 = 1$</p> <p>f) $(2^{-3} \cdot 3^2z^4)^2 : (6^{-1}z^3)^{-4} = (2^{-3} \cdot 3^2z^4)^2 \cdot (2^{-1} \cdot 3^{-1}z^3)^4 = 2^{-6} \cdot 3^4z^8 \cdot 2^{-4} \cdot 3^{-4}z^{12} = 2^{-10} \cdot 3^0z^{20} = \frac{z^{20}}{1024} \text{ ali } \frac{z^{20}}{2^{10}} = \left(\frac{z^2}{2}\right)^{10}$</p>
L91 / 341	<p>Dane izraze zapišite v obliki $2^p3^q a^r b^s$; $p, q, r, s \in \mathbb{Z}$.</p> <p>a) $6^2(ab^{-2})^{-2}(12a^4)^{-1} = 2^23^2a^{-2}b^4(2^23a^4)^{-1} = 2^23^2a^{-2}b^42^{-2}3^{-1}a^{-4} = 2^03^1a^{-6}b^4$ $p=0, q=1, r=-6, s=4$</p> <p>b) $\frac{(-72a^{-1})^{-1}(3b^2)^3}{(18a^{-1}b^2)^2} = (-1)^{-1}(2^33^2a^{-1})^{-1}(3b^2)^3(2 \cdot 3^2a^{-1}b^2)^{-2} = -2^{-3}3^{-2}a^13^3b^62^{-2}3^{-4}a^2b^{-4} = -2^{-5}3^{-3}a^3b^2$ $p=-5, q=-3, r=3, s=2$</p> <p>c) $\left(\frac{1}{3}\right)^{-2} \left(\frac{2a^{-1}}{b^{-2}}\right)^{-3} \left(\frac{0,5a}{b}\right)^2 = (3^{-1})^{-2}(2a^{-1}b^2)^{-3}\left(\frac{1}{2}ab^{-1}\right)^2 = 3^22^{-3}a^3b^{-6}(2^{-1})^2a^2b^{-2} = 2^{-5}3^2a^5b^{-8}$ $p=-5, q=2, r=5, s=-8$</p>	
L91 / 342	<p>Poenostavite izraze.</p> <p>a) $2^{x+2} + 3 \cdot 2^{x+1} - 2^x = 2^x(2^2 + 3 \cdot 2 - 1) = 2^x \cdot 9 = 9 \cdot 2^x$</p> <p>b) $3^{2x-1} + 2 \cdot 3^{2x-3} - 2 \cdot 3^{2x+1}$ <i>izpostavimo potenco 3 z najmanjšim eksponentom</i> $\rightarrow 3^{2x-3}(3^2 + 2 - 2 \cdot 3^4) = 3^{2x-3}(9 + 2 - 2 \cdot 81) = -151 \cdot 3^{2x-3}$</p> <p>c) $4^{-x} + 4^{-x-1} - 3 \cdot 4^{-x+2}$ <i>pri izpostavljanju, si pomagamo da pomnožimo nazaj</i> $\rightarrow 4^{-x-1}(4^1 + 1 - 3 \cdot 4^3) = 4^{-x-1}(5 - 3 \cdot 64) = -187 \cdot 4^{-x-1}$</p> <p>č) $\left(\frac{3}{4}\right)^{-x+1} - \left(\frac{3}{4}\right)^{-x+2} + \left(\frac{4}{3}\right)^{x-1}$ <i>tretji ulomek obrnemo, nato šele izpostavimo</i> $\rightarrow \left(\frac{3}{4}\right)^{-x+1} - \left(\frac{3}{4}\right)^{-x+2} + \left(\frac{3}{4}\right)^{-x+1} = \left(\frac{3}{4}\right)^{-x+1}\left(1 - \left(\frac{3}{4}\right)^1 + 1\right) = \left(\frac{3}{4}\right)^{-x+1}\left(2 - \frac{3}{4}\right) = \frac{5}{4} \cdot \left(\frac{3}{4}\right)^{-x+1}$</p>	
L91 / 343	<p>Razstavite.</p> <p>a) $3^{2x} + 6 \cdot 3^x + 8 = \frac{3^x=y, 3^{2x}=(3^x)^2=y^2}{\text{Vietovo pravilo}} \rightarrow y^2 + 6y + 8 = (y+2) \cdot (y+4) = \frac{\text{zamenjamo nazaj}}{\rightarrow} (3^x+2) \cdot (3^x+4)$</p> <p>b) $4^x - 3 \cdot 2^x + 2 = \frac{2^x=y}{\rightarrow} y^2 - 3y + 2 = (y-1) \cdot (y-2) = (2^x-1) \cdot (2^x-2)$</p> <p>c) $25^x - 5^x - 12 = \frac{5^x=y}{\rightarrow} y^2 - y - 12 = (y-4) \cdot (y+3) = \frac{y=5^x}{\rightarrow} (5^x-4) \cdot (5^x+3)$</p> <p>č) $a^{n+4} - a^{n+2} = a^{n+2}(a^2 - 1) = a^{n+2}(a-1)(a+1)$</p> <p>d) $b^{x-4} + b^{x-1} = b^{x-4}(b^3 + 1) = b^{x-4}(b+1)(b^2 - b + 1)$</p> <p>e) $u^{n+5} + 2u^{n+4} - 15u^{n+3} = u^{n+3}(u^2 + 2u - 15) = u^{n+3}(u-3)(u+5)$</p>	
L91 / 344	<p>Razstavite.</p> <p>a) $a^{x+2} + 3a^x - 4a^{x-2} = a^{x-2}(a^4 + 3a^2 - 4) = a^{x-2}(a^2-1)(a^2+4) = a^{x-2}(a-1)(a+1)(a^2+4)$</p> <p>b) $a^{2x-3} - 9a^{2x-1} = a^{2x-3}(1-9a^2) = a^{2x-3}(1-3a)(1+3a)$</p> <p>c) $x^{n+3} - 7x^{n+2} + 10x^{n+1} = x^{n+1}(x^2 - 7x + 10) = x^{n+1}(x-2)(x-5)$</p> <p>č) $x^{n+4}y^{n-1} + 13x^{n+3}y^n + 12x^{n+2}y^{n+1} = x^{n+2}y^{n-1}(x^2 + 13xy + 12y^2) = x^{n+2}y^{n-1}(x+y)(x+12y)$</p> <p>d) $250x^{3n} - 16 = 2(125x^{3n} - 8) = 2((5x^n)^3 - 2^3) = \frac{\text{po obrazcu } a^3-b^3}{\rightarrow} = 2(5x^n-2)(25x^{2n}+10x^n+4)$</p> <p>e) $64x^{n-6} - 2x^{n-1} = 2x^{n-6}(32-x^5) = 2x^{n-6}(2^5-x^5) = \frac{\text{po obrazcu } a^5-b^5}{\rightarrow} = 2x^{n-6}(2-x)(2^4+2^3x+2^2x^2+2x^3+x^4) = 2x^{n-6}(2-x)(x^4+2x^3+4x^2+8x+16)$</p>	

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Izračunajte in rezultat razstavite.

$$a) \frac{x^2 y^{-2} - 1}{1 + 2xy^{-1} + x^2 y^{-2}} = \frac{\frac{x^2}{y^2} - 1 / y^2}{1 + 2 \frac{x}{y} + \frac{x^2}{y^2} / y^2} = \frac{x^2 - y^2}{y^2 + 2xy + x^2} = \frac{(x-y)(x+y)}{(y+x)^2} = \frac{x-y}{x+y}$$

$$b) \frac{1}{1-2x^{-1}} + 4(x+3)^{-1} = \frac{1/x}{1-\frac{2}{x}} + \frac{4}{x+3} = \frac{x}{x-2} + \frac{4}{x+3} = \frac{x(x+3) + 4(x-2)}{(x-2)(x+3)} = \frac{x^2 + 3x + 4x - 8}{(x-2)(x+3)} = \frac{x^2 + 7x - 8 = (x+8)(x-1)}{(x-2)(x+3)} = \frac{(x+8)(x-1)}{(x-2)(x+3)}$$

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$$c) \frac{2x^{-2}}{1-2x^{-1} + x^{-2}} + \frac{x^{-1}}{1-x^{-1}} = \frac{\text{namesto, da prej pretvarjamov dvojne ulome, lahko tudi kar takoj množimo}}{\Rightarrow} = \frac{2x^{-2}/x^2}{1-2x^{-1} + x^{-2}/x^2} + \frac{x^{-1}/x}{1-x^{-1}/x} = \frac{2}{x^2 - 2x + 1} + \frac{1}{x-1} = \frac{2+x-1}{(x-1)^2} = \frac{x+1}{(x-1)^2}$$

$$\text{č)} \frac{a^{-2} + (ab)^{-1} + b^{-2}}{a^{-3} - b^{-3}} : \left(\frac{(b-a)^2}{\left(\frac{1}{ab}\right)^{-2}} \right)^{-1} = \frac{\frac{1}{a^2} + \frac{1}{ab} + \frac{1}{b^2} / a^3 b^3}{\frac{1}{a^3} - \frac{1}{b^3} / a^3 b^3} \cdot \frac{(b-a)^2}{(ab)^2} = \frac{ab^3 + a^2 b^2 + a^3 b}{b^3 - a^3} \cdot \frac{(b-a)^2}{(ab)^2} = \frac{ab(b^2 + ab + a^2)}{(b-a)(b^2 + ab + a^2)} \cdot \frac{(b-a)^2}{(ab)^2} = \frac{b-a}{ab}$$

Poenostavite.

$$a) \frac{a^{-1} + b^{-1}}{(ab)^{-1}} \cdot (a^2 - b^2)^{-1} = \frac{\frac{1}{a} + \frac{1}{b} / ab}{\frac{1}{ab} / ab} \cdot \frac{1}{a^2 - b^2} = \frac{b+a}{1} \cdot \frac{1}{(a-b)(a+b)} = \frac{1}{a-b}$$

$$b) \left(\frac{1}{a^2 - 6a} - \frac{2}{a^2 - 10a + 24} \right) \cdot (a+4)^{-2} = \left(\frac{1}{a(a-6)} - \frac{2}{(a-6)(a-4)} \right) \cdot \left(\frac{a-6}{a+4} \right)^2 = \frac{-a-4-(a+4)}{a-4-2a} \cdot \frac{(a-6)^2}{(a+4)^2} = \frac{-(a-6)}{a(a-6)(a-4)} = \frac{6-a}{a(a-4)(a+4)} \text{ ali } \frac{a-6}{a(4-a)(a+4)}_{\text{v knjigi}}$$

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$$c) \left((3-x)^{-1} + x+3 \right)^{-1} (x-3)^{-2} = \left(\frac{1}{3-x} + x+3 \right)^{-1} (x-3)^{-2} = \left(\frac{1+9-x^2=10-x^2}{3-x} \right)^{-1} \cdot \frac{1}{(x-3)^2} = \frac{3-x}{10-x^2} \cdot \frac{1}{(x-3)^2} = \frac{x-3}{x^2-10} \cdot \frac{1}{(x-3)^2} = \frac{1}{(x^2-10)(x-3)}$$

$$\text{č)} \frac{1-4a^{-1}-5a^{-2}}{1-2a^{-1}-3a^{-2}} \cdot (1-25a^{-2})^{-1} = \frac{1-\frac{4}{a}-\frac{5}{a^2} / a^2}{1-\frac{2}{a}-\frac{3}{a^2} / a^2} \cdot \left(1-\frac{25}{a^2} \right)^{-1} = \frac{a^2-4a-5}{a^2-2a-3} \cdot \left(\frac{a^2-25}{a^2} \right)^{-1} = \frac{(a-5)(a+1)}{(a-3)(a+1)} \cdot \frac{a^2}{(a-5)(a+5)} = \frac{a^2}{(a-3)(a+5)}$$

Izračunajte.

$$a) \frac{a^{x+2} - a^{x+1} - 6a^x}{a^{x+1} - 9a^{x-1}} = \frac{a^x(a^2 - a - 6)}{a^{x-1}(a^2 - 9)} = \frac{a^{1-x} \cdot a^x(a-3)(a+2)}{(a-3)(a+3)} = \frac{a(a+2)}{a+3}$$

$$b) \frac{x^{n+2} + 3x^{n+1} + 3x^n + x^{n-1}}{x^n - x^{n+2}} = \frac{x^{n-1} \overbrace{(x^3 + 3x^2 + 3x + 1)}^{(x+1)^3}}{x^n(1-x^2)} = \frac{x^{n-1-n}(1+x)^3}{(1-x)(1+x)} = \frac{x^{-1}(1+x)^2}{1-x} = \frac{(x+1)^2}{x(1-x)}$$

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$$c) \frac{x^{n-1} + 3x^{n-2}}{x^n - 6x^{n-1} + 9x^{n-2}} - \frac{x^{n-1} + 4x^{n-2}}{x^n + x^{n-1} - 12x^{n-2}} = \frac{x^{n-2}(x+3)}{x^{n-2} \underbrace{(x^2 - 6x + 9)}_{(x+3)^2}} - \frac{x^{n-2}(x+4)}{x^{n-2} \underbrace{(x^2 + x - 12)}_{(x-3)(x+4)}} = \frac{1}{x+3} - \frac{1}{x-3} = \frac{x-3-x-3}{(x+3)(x-3)} = \frac{-6}{(x+3)(x-3)} = \frac{6}{(3+x)(3-x)}$$

$$\text{č)} \frac{x^{-n+2} - 3x^{-n+1}}{x^{2-n} - 2x^{1-n}} - \frac{x^{1-n} + x^{-n}}{2x^{-n} - x^{1-n}} = \frac{x^{-n+1}(x-3)}{\underbrace{x^{1-n}}_{=x^{-n+1}}(x-2)} - \frac{x^{-n}(x+1)}{x^{-n}(2-x)} = \frac{x-3}{x-2} + \frac{x+1}{x-2} = \frac{2x-2}{x-2} = \frac{2(x-1)}{x-2}$$