Homework

1. $2x^2y - xy^2 = 0$

$a = 2y \quad b = -y^2 \quad c = 0$

$D = b^2 - 4ac$

If $D > 0$; $x = \frac{-b \pm \sqrt{D}}{2a}$ (2 roots)

If $D = 0$; $x = \frac{-b}{2a}$ (1 root)

If $D < 0$; No solution

if $y \neq 0$

$D = (-y^2)^2 - 4 \cdot 0 \cdot 2y$

$D = y^4 \qquad D > 0$

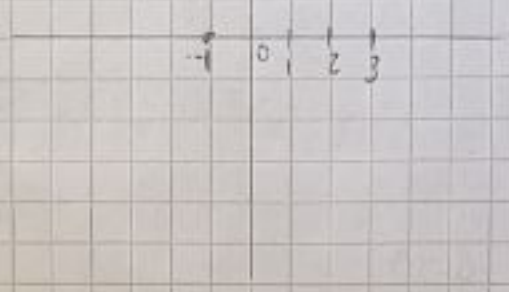
$x_1 = \frac{-(-y^2) + \sqrt{y^4}}{4a} \qquad x_1 = \frac{y^2 + y^2}{8y} \qquad x_1 = \frac{2y^2}{8y} = \frac{y^2}{4y} = \frac{y}{4}$

$x_2 = \frac{y^2 - y^2}{8y} = 0$

$p_1 = \frac{-(-1) + \sqrt{(-1)^2 - 4 \cdot 0}}{2}$ $p_1 = \frac{1 + \sqrt{1}}{2} = \frac{2}{2} = 1$

$p_2 = \frac{|-1|}{2} = \frac{0}{2} = 0$

б)



$p^2 - 2(-1)p = 0$

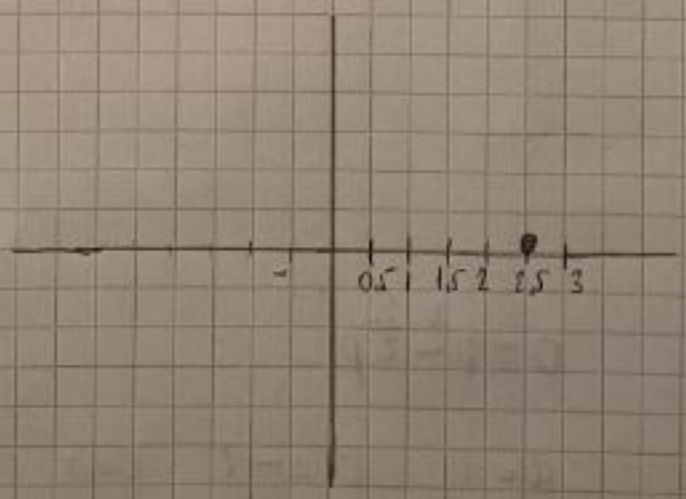
$p^2 + 2p = 0$

$a = 1 \quad b = 2 \quad c = 0$

$p_1 = \frac{-2 + \sqrt{2^2}}{2} = \frac{-2+2}{2} = \frac{0}{2} = p_1 = 0$

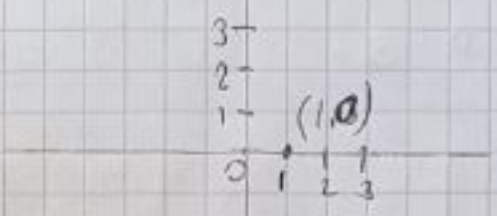
$p_2 = \frac{-2 - \sqrt{2^2}}{2} = \frac{-2-2}{2} = \frac{-4}{2} = -2$

2)



2. $y = p^2 - 2px$

а)



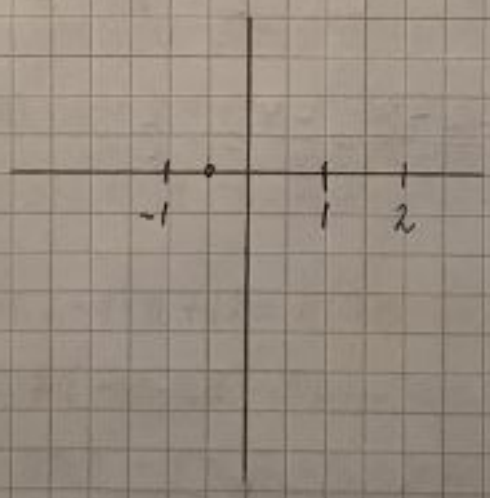
$0 = p^2 - 2p$

$a = 1 \quad b = -2 \quad c = 0$

$p_1 = \frac{-(-2) + \sqrt{(-2)^2 - 0}}{2} \quad p_1 = \frac{2 + \sqrt{4}}{2} = \frac{4}{2} = 2$

$p_2 = \frac{-(-2) - \sqrt{(-2)^2}}{2} = \frac{2 - \sqrt{4}}{2} = \frac{0}{2} = 0$

б)



$0 = p^2 - \frac{2}{2}p$

$a = 1 \quad b = -1 \quad c = 0$

7. $5y^2+y+y^3+5 = y(y^2+1)+5(y^2+1) = (y+5)(y^2+1)$

$y^3+2y-4-2y^2 = y(y^2+2)-(2+y^2)2 = (y^2+2)(y-2)$

$z^3+21+3z+7z^2 = z(z^2+3)+7(z^2+3) = (z+7)(z^2+3)$

$z-3z^2+z^3-3 = -3(z^2+1)+z(1+z^2) = (-3+z)(z^2+1)$

8. $x^3+28-14x^2-2x = x(x^2-2)+4(2-x^2) = (14+x)(x^2-2)$

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

$2b^3-6-4b^2+3b = (2b^2+3)\cdot b-2(2b^2+3) = (b-2)(2b^2+3)$

9. $16ab^2+5b^2c+10c^3+32ac^2 = 16a(b^2+2c^2)+5c(b^2+2c^2)$

$20n^2-35a-14an+5n = (10n-7a)2n+5(10n-7a)$

$18a^2+27ab+14ac+21bc = 2a(9a+7c)+3b(9a+7c)$

$2x^2yz-15yz-3xz^2+10xy^2 = -3z(xz+5y)+2xy(xz+5y)$

10. а) $ax-2a-3x+6 = (x-2)(a-3)$ $a=1.5$; $x=3.5$

$(3.5-2)(1.5-3) = 1.5\cdot(-1.5) = -2.25$

б) $2a+b+2a^2+ab = (1+a)(2a+b)$ $a=-1$; $b=998$

$(1-1)(-2+998) = 0$

в) $7by+4b-14y-8$; $y=\frac{5}{28}$ $b=\frac{2}{7}$

$(7y+4)(b-2) = \left(\frac{7\cdot 5}{28}+4\right)\left(\frac{2}{7}-2\right) = \left(\frac{5}{4}+4\right)\left(-\frac{12}{7}\right) = \frac{-21^3\cdot 12^3}{4_1\cdot 7} = -9$

г) $5ab-7b+5a^2-7a = (5a-7)(a+b)$ $a=3.7$ $b=-3.7$

$(5\cdot 3.7-7)(3.7-3.7) = 0$

$p^2 - 2\cdot(2{,}5)p = 0$

$p^2 - 5p = 0$

$a = 1 \quad b = -5 \quad c = 0$

$p_1 = \frac{-(-5) + \sqrt{(-5)^2 - 0}}{2} = \frac{5+5}{2} = \frac{10}{2} = 5$

$p_2 = \frac{-5) - \sqrt{(-5)^2}}{2} = \frac{5-5}{2} = \frac{0}{2}$

3. в) $n^2 - nm = n(n-m)$, $6a^2 - 9ab = 3a(2a-3b)$

$mn - n^2 = n(m-n)$, $2ab - 3b^2 = b(2a-3b)$

г) $4x - 8 = 4(x-2)$, $x^2 - 2x = x(x-2)$, $-5 - 15m = -5(1+3m)$

$21mn + 7n = 7n(3m+1)$

4. а) $2by - bz$, $2ay - az$; $4ax - az$, $4bx - bz$

б) $6ax - 3x$, $-2a + 1$; $3by - 3y$, $c - cb$

в) $a^3 - 2a^2$, $3a - 6$; $4ab - 2a^2b$

г) $3mn^2 - 6m^2n$, $a^2bn - 2abm$; $ax^3 - 9a^2x$, $9x^2 - x^4$

5. а) $3a + 3 + na + n = 3(a+1) + n(a+1) = (a+1)(3+n)$

б) $6mx - 2m + 9x - 3 = 2m(3x-1) + 3(3x-1) = (3x-1)(2m+3)$

в) $ax + 3x + 4a + 12 = x(a+3) + 4(a+3) = (a+3)(4+x)$

г) $2mx - 3m + 4x - 6 = m(2x-3) + 2(2x-3) = (2x-3)(2+m)$

6. а) $7kn - 6k - 14n + 12 = k(7n-6) - 2(7n-6) = (7n-6)(k-2)$

б) $7x + 7a - 5ax - 5a^2 = 7(x+a) - 5a(x+a) = (x+a)(7-5a)$

в) $9m^2 - 9mn - 5m + 5n = 9m(m-n) - 5(m-n) = (m-n)(9m-5)$

г) $bc + 3ac - 2ab - 6a^2 = c(b+3a) - 2a(b+3a) = (b+3a)(c-2a)$

11. $40a^3bc + 21bc - 56ac^2 - 15a^2b^2 = (-7c + a^2 \cdot 5b)(8ac - 3b)$

$16xy^2 - 5y^2z - 10z^3 + 32xz^2 = (16x - 5z)(y^2 + 2z^2)$

$30x^2 + 10c - 25cx - 12x = (-5c + 6x)(5x - 2)$

$18x^2z - 10kxy + 20k^2y - 36kxz = 2(x - 2k)(9xz - 5ky)$

12. $ax^2 - ay - bx^2 + cy + by - cx^2 = (x^2 - y)(a - b - c)$

$xy^2 - by^2 - ax + ab + y^2 - a = (y^2 - a)(1 + x - b)$

$ax + bx + cx + ay + by + cy = (x + y)(a + b + c)$

$ab - a^2b^2 + a^3b^3 - c + abc - ca^2b^2 =$ unsimplifiable

Homework 8 30.17

а) $\frac{910}{137^2-123^2} = \frac{910}{(137-123)(137+123)} = \frac{910}{14 \cdot 260} = \frac{91}{364} = \frac{1}{4}$

б) $\frac{324^2-36^2}{1440} = \frac{(324-36)\cdot(324+36)}{1440} = \frac{288 \cdot 360}{1440} = 72$

в) $\frac{13.2 \cdot 9.8 + 13.2 \cdot 2.2}{24} = \frac{13.2(9.8+2.2)}{24} = \frac{13.2 \cdot 12}{24_2} = \frac{13.2}{2} = 6.6$

г) $\frac{4.5 \cdot 3.1 - 4.5 \cdot 2.1}{0.1} = \frac{4.5 \cdot (3.1-2.1)}{0.1} = \frac{4.5 \cdot 1}{0.1} = 4.5 \cdot 10 = 45$

30.18

а) $2x^2 + xy = 0$

$xy = -2x^2$

$y = \frac{-2x^2}{x}$

$y = -2x$

б) $xy - 5y = 0$

$xy = 5y$ $\quad y = \frac{5y}{x}$

$x = \frac{5y}{y}$

$x = 5$

в) $y^2 - 3xy = 0$

$y_2 = 3xy$

$y = \frac{3xy}{y}$

$y = 3x$

г) $4x + xy = 0$

$xy = -4x$

$y = -\frac{4x}{x}$

$y = -4$

31.1

а) $\frac{2m^2}{m^2} = 2$, $\frac{4}{2} = 2$, $\frac{2m}{m} = 2$

б) $\frac{4x}{x} = 4$; $\frac{8xy}{xy} = 8$; $\frac{16x}{x} = 16$

в) $\frac{15ab^2}{ab} = 15b$, $\frac{25ab}{25b} = a$, $\frac{30a^2b}{a^2b} = 30a$

г) $\frac{56xyz}{xy} = 56z$, $\frac{42x^2z}{xz} = 42x$, $\frac{14y^2z}{y^2z} = 14yz$