

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

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

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

$$x_1 = \frac{y^2 + y^2}{8y}$$

$$x_1 = \frac{2y^2}{8y} = \frac{y^2}{4y} = \frac{y}{4}$$

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

X

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

$$p_1 = \frac{1 + \sqrt{1}}{2} = \frac{2}{2} = 1$$

$$p_2 = \frac{-(-1) - \sqrt{(-1)^2 - 4 \cdot 0}}{2} = \frac{1 - 1}{2} = 0$$

6)

0 1 2 3

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

$$p^2 + 2p = 0$$

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

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

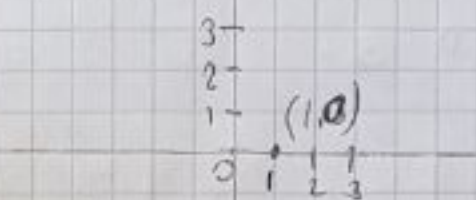
$$p_2 = \frac{-2 - \sqrt{2^2 - 4 \cdot 1 \cdot 0}}{2} = \frac{-2 - 2}{2} = \frac{-4}{2} = -2$$

2)

0.5 1 1.5 2 2.5 3

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

a)



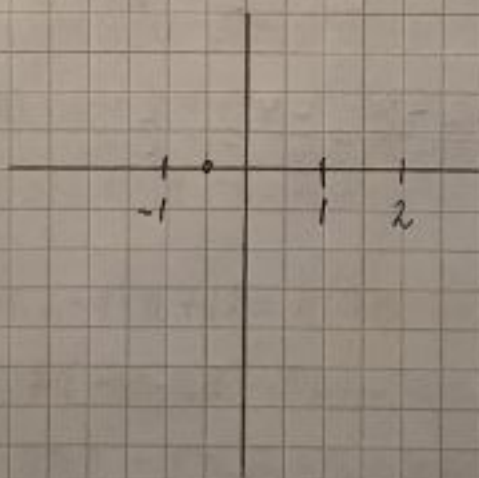
$$0 = p^2 - 2p$$

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

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

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

d)



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

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

$$7. \begin{aligned} 5y^2 + y + y^3 + 5 &= y(y^2 + 1) + 5(y^2 + 1) = (y + 5)(y^2 + 1) \\ y^3 + 2y - 4 - 2y^2 &= y(y^2 + 2) - (2 + y^2)2 = (y + 2)(y - 2) \\ z^3 + 21 + 3z + 7z^2 &= z(z^2 + 3) + 7(z^2 + 3) = (z + 7)(z^2 + 3) \\ z - 3z^2 + z^3 - 3 &= -3(z^2 + 1) + z(1 + z^2) = -(3 + z)(z^2 + 1) \end{aligned}$$

$$8. \begin{aligned} x^3 + 28 - 14x^2 - 2x &= x(x^2 - 2) + 4(2 - x^2) = (14 + x)(x^2 - 2) \\ x^3 - 6 + 2x - 3x^2 &= x(x^2 + 2) - 3(x^2 + 2) = (x - 3)(x^2 + 2) \\ 2b^3 - 6 - 4b^2 + 3b &= (2b^2 + 3) \cdot b - 2(2b^2 + 3) = (b - 2)(2b^2 + 3) \end{aligned}$$

$$9. \begin{aligned} 16ab^2 + 5b^2c + 10c^3 + 32ac^2 &= 16a(b^2 + 2c^2) + 5c(b^2 + 2c^2) \\ 20n^2 - 35a - 14an + 50n &= (10n - 7a)2n + 5(10n - 7a) \\ 18a^2 + 27ab + 14ac + 21bc &= 2a(9a + 7c) + 3b(9a + 7c) \\ 2x^2yz - 15yz - 3xz^2 + 10xy^2 &= -3z(xz + 5y) + 2xy(xz + 5y) = ? \end{aligned}$$

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

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

$$c) 2a + b + 2a^2 + ab = (1 + a)(2a + b) \quad a = -1; b = 998$$

$$(1 - 1)(-2 + 998) = 0 \quad \checkmark$$

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

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

$$2) 5ab - 7b + 5a^2 - 7a = (5a - 7)(a + b) \quad a = 3.7; b = -3.7$$

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

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

$$p^2 - 5p = 0$$

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

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

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

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

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

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

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

$$4. \quad a) \quad 2by - bz, \quad 2ay - az; \quad 4ax - az, \quad 4bx - bz$$

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

$$c) \quad a^3 - x^2, \quad 3a - 6; \quad 4ab - 2a^2b$$

$$2) \quad 3mn^2 - 6m^2n, \quad a^3b - 2abm; \quad a^3x^3 - 9a^2x^2, \quad 9x^2 - x^4$$

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

$$b) \quad 6mx - 2m + 9x - 3 = 2m(3x-1) + 3(3x-1) = (3x-1)(2m+3)$$

$$c) \quad ax + 3x + 4a + 12 = x(a+3) + 4(a+3) = (a+3)(x+4)$$

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

$$6. \quad a) \quad 7kn - 6k - 14n + 12 = k(7n-6) - 2(7n-6) = (7n-6)(k-2)$$

$$b) \quad 7x + 7a - 5ax - 5a^2 = 7(x+a) - 5a(x+a) = (x+a)(7-5a)$$

$$c) \quad 9m^2 - 9mn - 5m + 5n = 9m(m-n) - 5(m-n) = (m-n)(9m-5)$$

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

$$11. \quad 40a^3bc + 21bc - 56ac^2 - 15a^2b^2 = (-4c + a^2 \cdot 5b)(8ac - 3b)$$

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

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

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

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

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

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

$$ab - a^2b^2 + a^3b^3 - c + abc - ca^2b^2 = \text{unsimplifiable}$$

Homework 8 30.17

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

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

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

$$2) \frac{4.5 \cdot 3.1 - 4.5 \cdot 2.1}{0.1} = \frac{4.5 \cdot (3.1 - 2.1)}{0.1} = \frac{4.5 \cdot 1}{0.1} = 4.5 \cdot 10 = 45$$

30.18

$$a) 2x^2 + xy = 0$$

$$xy = -2x^2$$

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

$$y = -2x$$

$$b) xy - 5y = 0$$

$$xy = 5y$$

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

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

$$x = 5$$

$$b) \frac{y^2}{2} - 3xy = 0$$

$$\frac{y^2}{2} = 3xy$$

$$y = \frac{3xy}{\frac{y}{2}}$$

$$y = 3x$$

$$2) 4x + xy = 0$$

$$xy = -4x$$

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

$$y = -4$$

31.1

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

$$b) \frac{4x}{x} = 4, \frac{8xy}{xy} = 8, \frac{16x}{x} = 16$$

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

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