

346. b) $2x^3 - 4x^2 + 2x =$

$$x \cdot (2x^2 - 4x + 2) = 0$$

$$ax^2 + bx + c = 0$$

a b c

$$2x^2 - 4x + 2 = 0$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4 \cdot 2 \cdot 2}}{2 \cdot 2} = 1$$

kahteenkertainen juuri

$$x(x-1)(x-1) = 0$$

$$a(x-x_1)(x-x_2) = ax^2 + bx + c$$

↑ ↑
nollak.

357. $Q(x) = 2ax^2 - x + a^2$

Millä a :n arvolla $Q(x)$ on jaoll. $x+1$:llä?

Ottava sama nolлак.!

$$x+1=0$$

$x=-1$ on ottava $Q(x)$:n nolлак.

$$\Rightarrow Q(-1) = 0 \Rightarrow$$

$$2a(-1)^2 - (-1) + a^2 = 0$$

$$2a + 1 + a^2 = 0$$

$$\begin{matrix} \uparrow & \uparrow & \uparrow \\ b=2 & c=1 & a=1 \end{matrix}$$




$$a = \frac{-2 \pm \sqrt{4-4}}{2} = -1$$

V: $Q(x) = -2x^2 - x + 1$

Diskriminantti

- kertoo toisen asteen yhtälön ratkaisujen lukumäärän
- ratk. kaava $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$,

$$\text{Diskriminantti} = D = b^2 - 4ac$$

- $D > 0 \rightarrow 2$ ratk. 
- $D = 0 \rightarrow 1$ ratk. 
- $D < 0 \rightarrow 0$ ratk. 

Esim. Montako ratk. on yhtälö

$$a) \quad \underset{a}{2}x^2 - \underset{b}{7}x + \underset{c}{4} = 0$$

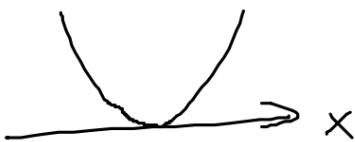


$$D = (-7)^2 - 4 \cdot 2 \cdot 4 = 49 - 32 = 17$$

V: 2 ratk.

$$D = b^2 - 4ac$$

$$b) \quad \underset{a}{1}x^2 - \underset{b}{6}x + \underset{c}{9} = 0$$



$$D = (-6)^2 - 4 \cdot 9 = 36 - 36 = 0$$

V: 1 ratk.

$$c) \quad -\underset{a}{\frac{1}{2}}x^2 - \underset{b}{1}x - \underset{c}{4} = 0$$



V: ei ratk.

$$D = (-1)^2 - 4 \cdot (-\frac{1}{2}) \cdot (-4) = -7$$

364. $X^2 + ax - 1 = 0$
 $a=1$ $b=a$ $c=-1$

$$D = b^2 - 4ac = a^2 - 4 \cdot 1 \cdot (-1) = a^2 + 4 > 0$$

\uparrow $a^2 \geq 0$ \uparrow posit.

\rightarrow aina 2 ratk.

372. $X^2 + \underline{2t}x + \underline{t^2} + \underline{3t} + \underline{x} = 0$

$$X^2 + X(2t+1) + (t^2+3t) = 0$$

$$a=1 \quad b=2t+1 \quad c=t^2+3t$$

$$D = (2t+1)^2 - 4 \cdot 1 \cdot (t^2+3t) < 0$$

$$\cancel{4t^2} + 4t + 1 - \cancel{4t^2} - 12t < 0$$

$$-8t + 1 < 0$$

$$\rightarrow -8t < -1 \quad \parallel : -8$$

$$\underline{\underline{t > \frac{1}{8}}}$$

S. 72

$$361. \quad a) \quad 9x^2 + 12x - 4 = 0$$

$$a = 9$$

$$b = 12$$

$$c = -4$$

$$D = b^2 - 4ac = 12^2 - 4 \cdot 9 \cdot (-4) = 144 + 144 \\ = 288$$

$$V: 2$$

$$362. \quad -x^2 - x - k = 0$$

$$a = -1$$

$$b = -1$$

$$c = -k$$

$$\rightarrow D = (-1)^2 - 4 \cdot (-1) \cdot (-k) \text{ ykisi rakk.}$$

$$\rightarrow 1 - 4k = 0$$

$$k = \underline{\underline{\frac{1}{4}}}$$

