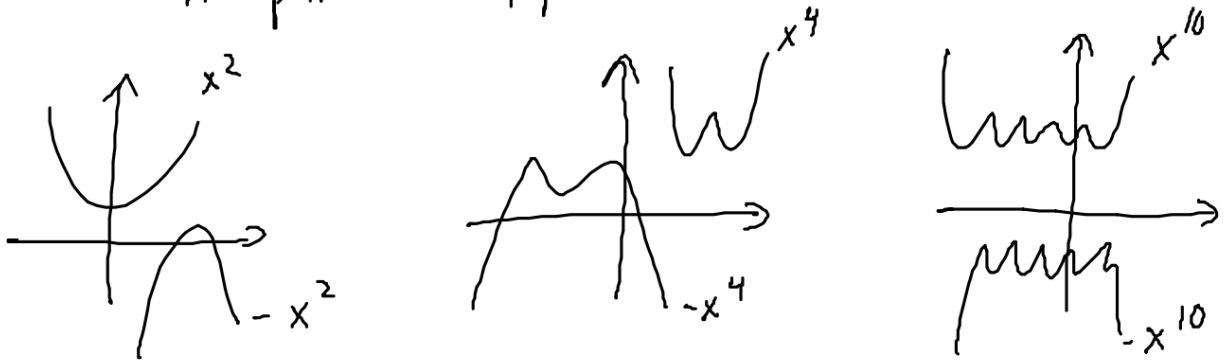


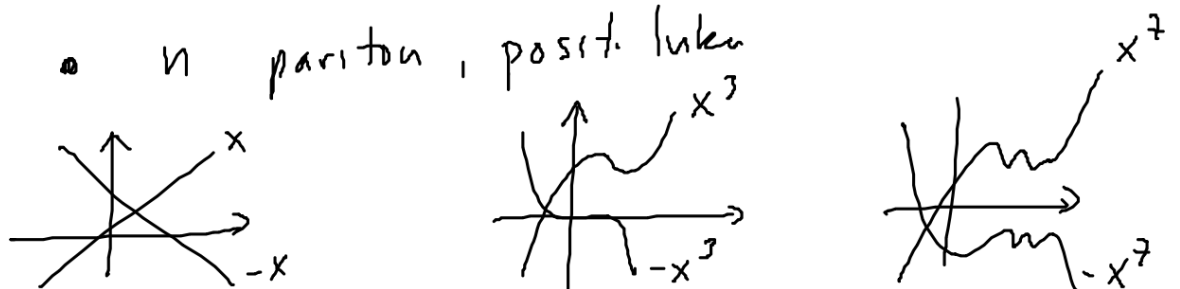
Yleinen potenssifunktio

- MAA7: $f(x) = x^n$, n kokon.

• n parillinen, posit. kokon.



• n pariton, posit. kokon.



• n negat. kokon. luku, esim

$$\left. \begin{aligned} f(x) &= x^{-2} = \frac{1}{x^2} \\ f(x) &= x^{-7} = \frac{1}{x^7} \end{aligned} \right\} \begin{array}{l} \text{Määrit. joukko} \\ x \neq 0 \end{array}$$

$$f(x) = (2x+1)^{-3} = \frac{1}{(2x+1)^3}, \quad \begin{array}{l} 2x+1 \neq 0 \\ x \neq -\frac{1}{2} \end{array}$$

• n murtoluku :

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

Määrit. joukko?

Luku 5.

$$f(x) = x^{\frac{1}{2}} = \sqrt{x}, \quad \text{Määrit. } x \geq 0$$

- gleichen Potenzfunktion

$$f(x) = x^r$$

$$x > 0, r \in \mathbb{R}$$

$$D x^r = r x^{r-1}$$

$$\text{Es im. } D(3x^{-\frac{2}{3}} + 2x^3 + 1)$$

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

$$= -2x^{-\frac{5}{3}} + 6x^2$$

- pot. yhtälön ratk.

$$\bullet \quad x^3 + 2x^2 = 0$$

$$x^2(x+2)=0$$

$$x=0 \text{ tai } x=-2$$

$$\bullet \quad x^{-2} = 4$$

$$\frac{1}{x^2} = 4 \quad x \neq 0$$

$$x^2 = \frac{1}{4}$$

$$x = \pm \frac{1}{2}$$

$$\bullet \quad x^{\frac{2}{3}} = 8 \quad \parallel ()^{\frac{3}{2}} \quad \boxed{(a^m)^n = a^{mn}}$$

$$\left(x^{\frac{2}{3}}\right)^{\frac{3}{2}} = 8^{\frac{3}{2}}$$

$$x \approx 22,6$$

$$x^{-\frac{1}{2}} = 3$$

$$x^{-\frac{1}{2}} = 3 \quad \parallel ()^{-\frac{2}{1}}$$

$$\left(x^{-\frac{1}{2}}\right)^{-\frac{2}{1}} = 3^{-\frac{2}{1}}$$

$$x = \frac{1}{9}$$

404. a) $x^{\frac{1}{2}} = 2 \quad || ()^2$

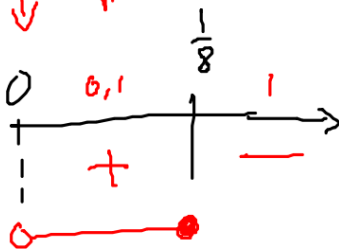
$$(a^m)^n = a^{m \cdot n}$$

$$(x^{\frac{1}{2}})^2 = 2^2$$

$$x = 4$$

(Tark. $4^{\frac{1}{2}} = 2$.)

kleinen pot.-funktion
↓
määr./
nim. nollak.



b)

$$2x^{-\frac{4}{3}} - 32 \geq 0$$

$$2x^{-\frac{4}{3}} = 32 \quad || :2$$

$$x^{-\frac{4}{3}} = 16 \quad || ()^{-\frac{3}{4}}$$

$$x = 16^{-\frac{3}{4}} = \frac{1}{8} \quad (\text{tark. ok})$$

$$c) (2x-4)^{\frac{3}{4}} \leq 8$$

$$(2x-4)^{\frac{3}{4}} - 8 \leq 0$$

$$(2x-4)^{\frac{3}{4}} = 8$$

$$\parallel (\)^{\frac{4}{3}}$$

$$2x-4 = 8^{\frac{4}{3}} = 8^1 \cdot 8^{\frac{1}{3}} = 8 \cdot 2 = 16$$

$$2x = 20$$

$$x = 10$$

(fark. ok)

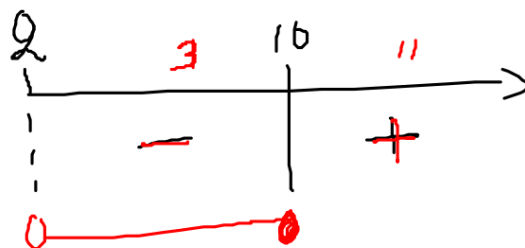
yleinen pot.

funkto määr.

kun kantakulu > 0:

$$2x-4 > 0$$

$$\underline{\underline{x > 2}}$$



$$V: 2 < x \leq 10$$

4/11. $f(x) = -2x^2 + 2x^{\frac{3}{2}} + x$

$x > 0$, yf. pot. funktion
määr. joules

$$f'(x) = -4x + 2 \cdot \frac{3}{2} x^{\frac{3}{2}-1} + 1$$

$$-4x + 3x^{\frac{1}{2}} + 1 = 0$$

	0	0,5	1	2
f'		+		-
f		↗		↘

$V: \begin{cases} \text{Suurin arvo} = f(1) = 1 \\ \text{pienin ei ole} \end{cases}$

$$3x^{\frac{1}{2}} = 4x - 1$$

$$x^{\frac{1}{2}} = \frac{4x-1}{3} \quad || (\)^2$$

$$x = \frac{(4x-1)^2}{9}$$

$$9x = 16x^2 - 8x + 1$$

$$16x^2 - 17x + 1 = 0$$

$$a \quad b \quad c$$

$$x = 1 \quad \text{tai} \quad x = \frac{1}{16}$$

Tark.
 $x=1$ ok
 $x=\frac{1}{16}$ ei ok