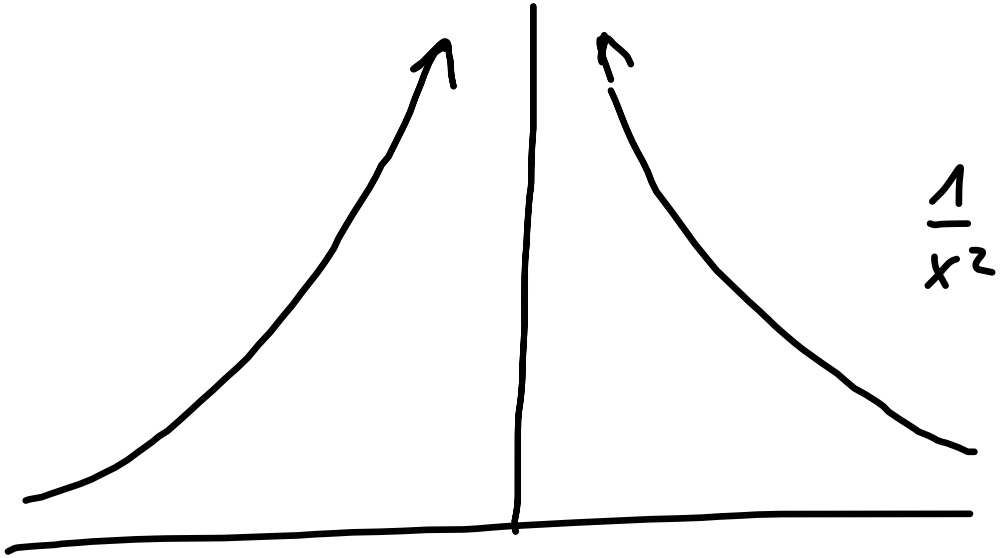
$$\lim_{x \to 0} \frac{e^{-\frac{1}{x^2}}}{x^{100}} = \dots = c \cdot \underline{\underline{\lim_{x \to 0}}} \, e^{-\frac{1}{x^2}} =$$

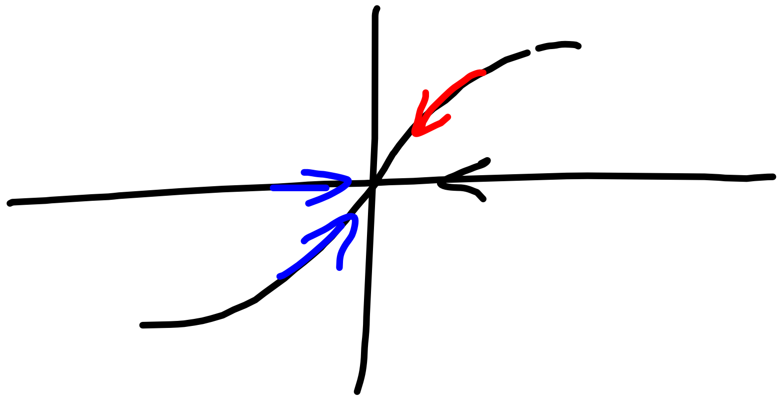
$$= \left[e^{-\infty} = 0 \right] = \underline{\underline{0}}$$



$$\lim_{x \to 2} \frac{2x^2 - 5x + 5}{x^2 - x - 2} = \left[\frac{3}{0}\right] = \text{neex.}$$

$$\left[\begin{aligned} &\lim_{x \to 2^+} \frac{3}{(x-2)\cdot(x+1)} = \frac{\oplus}{\oplus \quad \oplus} = +\infty \\ &\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \neq \\ &\lim_{x \to 2^-} \frac{3}{(x-2)\cdot(x+1)} = \frac{\oplus}{\ominus \quad \oplus} = -\infty \end{aligned}\right]$$

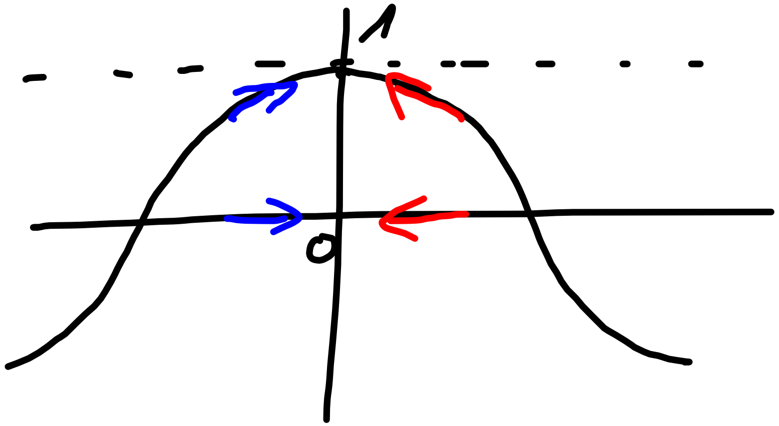
$$\lim_{x \to 0} \frac{2x+3}{\sin x} = \left[\frac{3}{0} \right] = \text{neex.}$$



$$\lim_{x \to 0^+} \frac{+}{+} = +\infty$$

$$\lim_{x \to 0^-} \frac{+}{-} = -\infty$$

$$\lim_{x \to 0} \frac{x^2 - 1}{\cos x - 1} = \left[\frac{-1}{0} \right] = +\infty$$



$$\lim_{x \to 0^+} \frac{-}{-} = +\infty$$

$$\lim_{x \to 0^-} \frac{-}{-} = +\infty$$

GLOB. EXTR. FCE

$g(x) = 2x^3 - 3x^2 - 36x$ na $I = [-5, 5]$

a) L. EXTR.:

$g'(x) = 6x^2 - 6x - 36 = 0$

$x^2 - x - 6 = 0$

$(x-3)\cdot(x+2) = 0$

$\underbrace{x = 3, \quad x = -2}$ $\in I$ ✓

b) HR. BODY: $\underbrace{x = -5, \quad x = 5}$

<u>Celkem</u> :

$g(3) = -81$

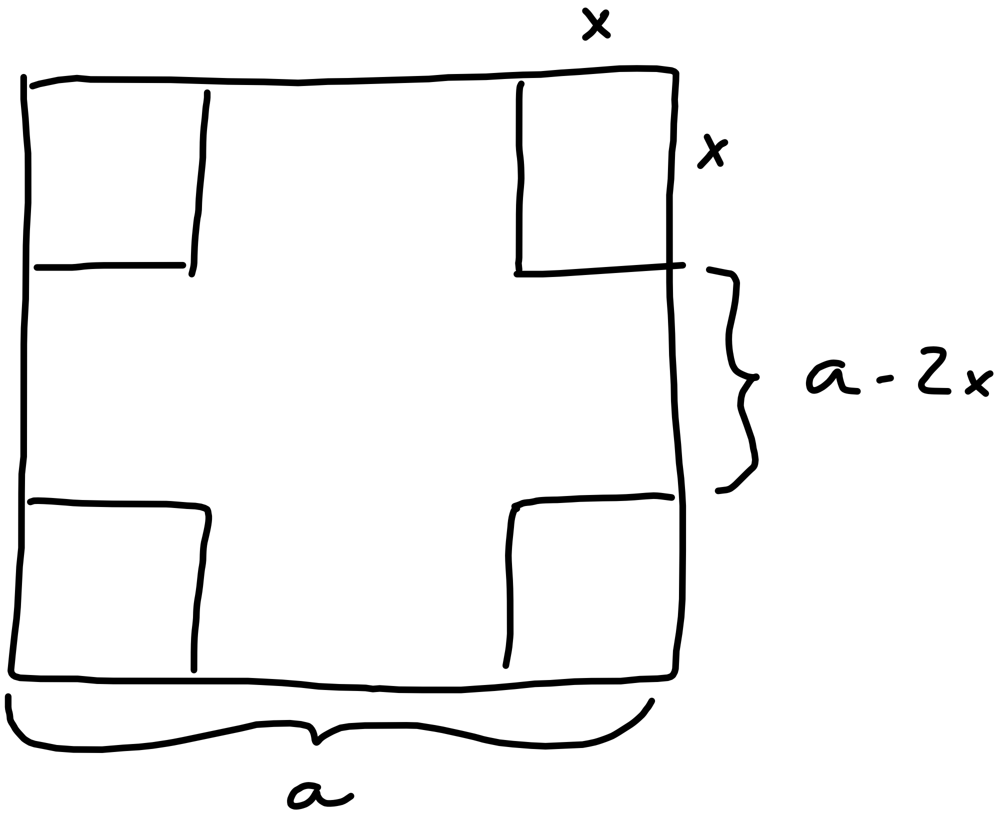
$g(-2) = 44$ G. max.

$g(-5) = -145$ G. min.

$g(5) = -5$

G. max. v $x = -2$, hodnota $= 44$.

G. min $x = -5$, $= -145$.



$$V = (a-2x)^2 \cdot x = a^2x - 4ax^2 + 4x^3 =$$

$$= \underline{\underline{V(x)}}$$

$$V'_{(x)} = a^2 - 8ax + 12x^2 = 0$$

$$D = 16a^2$$

$$x_{1,2} = \frac{8a \pm 4a}{24} = \begin{cases} \frac{a}{2} \ \dots \text{min.} \\ \frac{a}{6} \ \dots \text{max} \end{cases}$$

$$x \in \left[0, \frac{a}{2}\right]$$

$$V_{max} = V\left(\frac{a}{6}\right) = \frac{2a^3}{27}$$

$28 = a + b\,, \quad a \geq 0\,, b \geq 0$

$a^2 + b^3 = \text{min.}$

$a = 28 - b$ dos.

$\Rightarrow f(b) = (28-b)^2 + b^3$ ... fce prom. $\underline{\underline{b}}$

$I = [0; 28]$

$$f'(b) = -2\cdot(28-b) + 3b^2 =$$

$$= 3b^2 + 2b - 56 = 0$$

$$D = 676, \quad \sqrt{D} = 26$$

$$b_{1,2} = \frac{-2 \pm 26}{6} = \begin{cases} \boxed{4 \in I} \\ -\frac{14}{3} \notin I \end{cases}$$

GLOB. EXTR.:

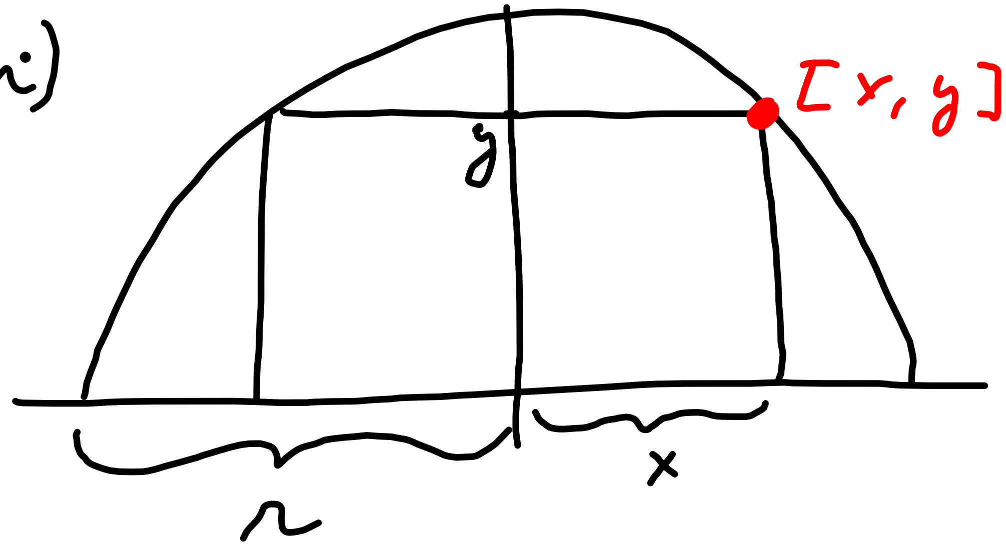
$$f(0) = 28^2 = 784$$

$$f(28) = 28^3 = \text{moc}$$

$$\boxed{28 = 24 + 4}$$

$$f(4) = 24^2 + 4^3 = 640 \rightarrow \text{G. max.}$$

(i)



$[x, y] \ldots \; x^2 + y^2 = r^2$

$$S = \underbrace{2 \cdot x}_{\downarrow\ \max} \cdot \underbrace{y}$$

$y = +\sqrt{r^2 - x^2} \; \ldots$ DOS. DO $\underline{\underline{S}}$

$$S(x) = 2 \cdot x \cdot \sqrt{r^2 - x^2}$$

$$S'(x) = \frac{2(r^2 - 2x^2)}{\sqrt{r^2 - x^2}} = 0 \quad \Leftrightarrow$$

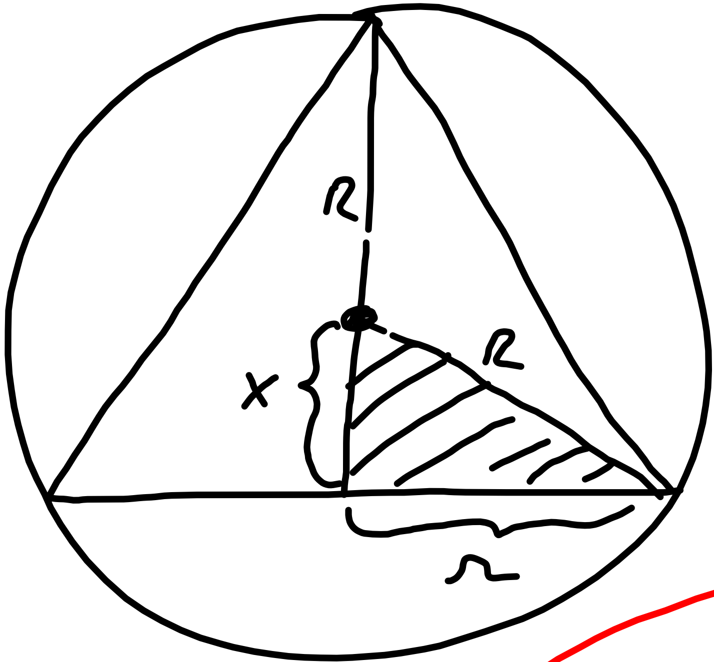
$$\Leftrightarrow \quad r^2 - 2x^2 = 0$$

$$x = \pm \frac{r}{\sqrt{2}}$$

kl. vzorec. $\Rightarrow \quad x = \frac{r}{\sqrt{2}}$

(dos. do $y = \sqrt{\ }$) $\Rightarrow y = \frac{\sqrt{2}}{2} r$

$$\underline{\underline{S_{max} = r^2}}$$



$x = v - R \Rightarrow v = x + R$

$V = \frac{1}{3}\pi r^2 \cdot v$

$x = \sqrt{R^2 - r^2}$

$v = x + R =$

$= \sqrt{R^2 - r^2} + R$

DOS. DO V

$\Rightarrow V(r) = \frac{1}{3}\pi r^2 \cdot \left(R + \sqrt{R^2 - r^2}\right)$

$r \in [0, R]$

$$V'(r) = \frac{2}{3}\pi r R + \frac{2}{3}\pi r\sqrt{R^2-r^2} +$$

$$+\frac{\pi r^2}{3}\cdot\frac{-2r}{2\sqrt{R^2-r^2}} = 0 \quad \Big/ \; r \neq 0, \; \cdot\frac{1}{r}$$

$$\vdots \qquad /^2$$

$$\vdots$$

$$r^2\cdot(9r^2-8R^2)=0$$

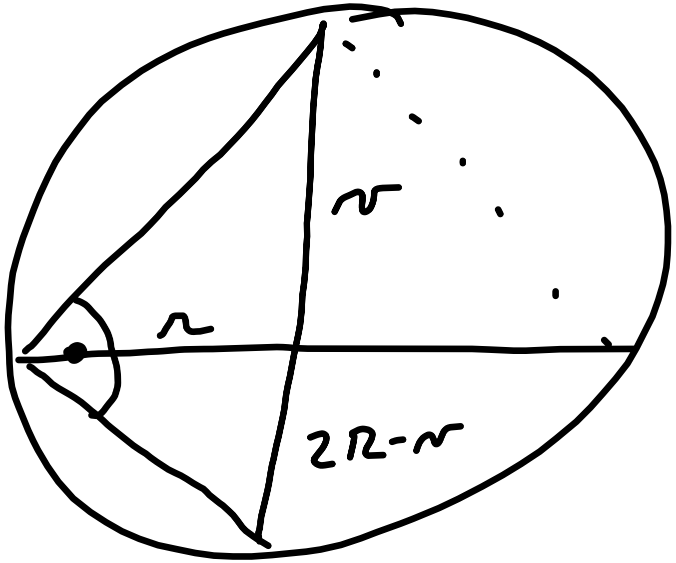
$$\Leftrightarrow \cancel{r=0} \quad \vee \quad r = \pm\frac{2\sqrt{2}}{3}R$$

$$\left(\Rightarrow v = \frac{4}{3}R\right)$$

$$V(R) = \frac{1}{3}\pi R^3$$

$$V\left(\frac{2\sqrt{2}}{3}R\right) = \frac{32}{81}\pi R^3 \quad \ldots \text{ G. MAX.}$$

$$V(0) = 0 \quad >$$



$$r^2 = v \cdot (2R - v)$$

(EUKL. VĚTA O VÝŠCE

$$V = \frac{1}{3}\pi r^2 \cdot v \ldots = V(v)$$

$$v \in [0, 2R]$$

ZISK = VÝNOS − NÁKLADY

$$p(x) = r(x) - c(x) =$$

$$= 9x - (x^3 - 6x^2 + 15x) =$$

$$= -x^3 + 6x^2 - 6x \quad \text{(HLEDÁM MAX)}$$

$$p'(x) = -3x^2 + 12x - 6 = 0$$

$$\underline{\underline{x_{1,2} = 2 \pm \sqrt{2}}}$$

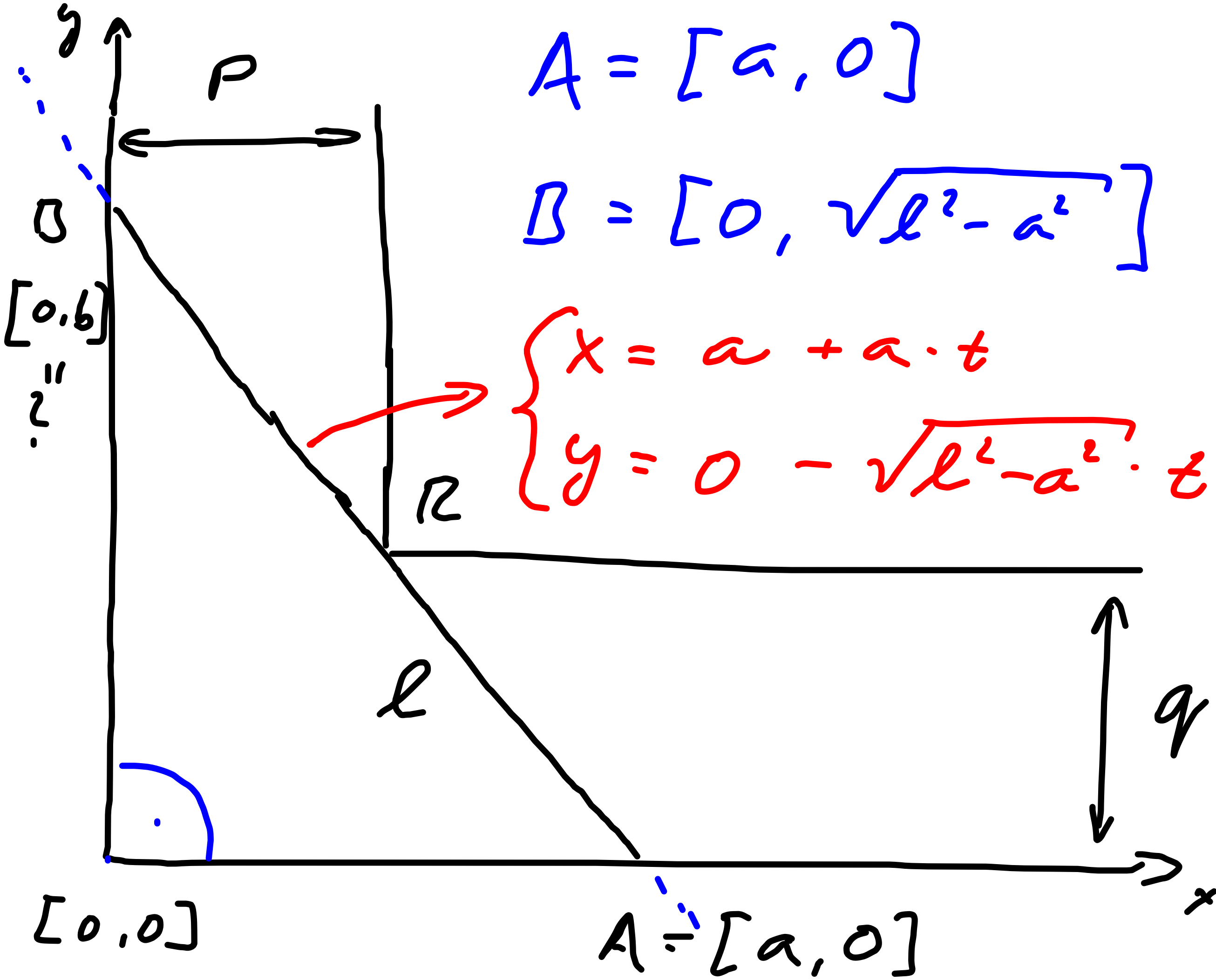
$$P''(x) = -6x + 12$$

$$P''(2+\sqrt{2}) = -6\sqrt{2} < 0 \Rightarrow \text{MAX}$$

$$P''(2-\sqrt{2}) = 6\sqrt{2} > 0 \Rightarrow \text{MIN}$$

$\Rightarrow$ MAX. ZISK ... $2+\sqrt{2}$ TIS. KALK.

(3414)



$$A = [a, 0]$$

$$B = [0, \sqrt{\ell^2 - a^2}]$$

$$A - B = (a, -\sqrt{\ell^2 - a^2})$$

$$\left\{\begin{aligned} x &= a + a \cdot t \\ y &= 0 - \sqrt{\ell^2 - a^2} \cdot t \end{aligned}\right\} \Rightarrow \begin{aligned} \frac{x}{a} &= 1 + t \\ \frac{y}{\sqrt{\ell^2 - a^2}} &= -t \end{aligned}$$

$$\downarrow \oplus$$

$$x = a_1 + (a_1 - b_1) \cdot t \qquad A = [a_1, a_2]$$

$$y = a_2 + (a_2 - b_2) \cdot t \qquad B = [b_1, b_2]$$

$$\circledast \quad \frac{x}{a} + \frac{y}{\sqrt{\ell^2 - a^2}} - 1 = 0$$

DOTYK PRO
$[x, y] = [p, q]$

def.: $$f(a) = \frac{p}{a} + \frac{q}{\sqrt{\ell^2 - a^2}} - 1$$

$$a \in (0, \ell)$$

$$f'(a) = -\frac{p}{a^2} + \frac{-2aq}{-2\,(\ell^2 - a^2)^{\frac{3}{2}}} = 0$$

$$f'_{(a)} = 0$$

$$a^3 q - p \cdot (l^2 - a^2)^{3/2} = 0 \quad / \frac{2}{3} \qquad (\text{ČITATEL})$$

$$a^2 q^{\frac{2}{3}} = p^{\frac{2}{3}} \cdot (l^2 - a^2)$$

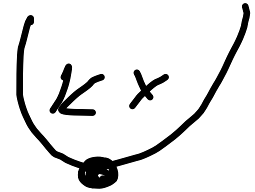
$$a^2 \cdot (q^{\frac{2}{3}} + p^{\frac{2}{3}}) = p^{\frac{2}{3}} \cdot l^2$$

$$a = \pm \frac{p^{\frac{1}{3}} \cdot l}{(p^{\frac{2}{3}} + q^{\frac{2}{3}})^{\frac{1}{2}}} =: a_0 \quad (\text{n.k.})$$

$$f''(a) = \frac{2p}{a^3} + \frac{q\cdot(\ell^2-a^2)^{3/2} + 3a\,q^2(\ell^2-a^2)^{1/2}}{(\ell^2-a^2)^3}$$

$$f''(a) > 0 \qquad \forall a \in (0,\ell)$$

$f(a)$ ...



ABY SE DOTKL

$$f(a_0) = \ldots = \frac{\left(p^{2/3}+q^{2/3}\right)^{3/2}}{\ell} - 1 = 0$$

$$\Rightarrow \boxed{\ell_{max} = \left(p^{2/3}+q^{2/3}\right)^{3/2}}$$

$$T_n(x) = f(x_0) + f'(x_0)\cdot(x-x_0) +$$

$$+ \frac{f''(x_0)}{2!}\cdot(x-x_0)^2 + \ldots +$$

$$+ \frac{f^{(n)}(x_0)}{n!}\cdot(x-x_0)^n$$

$$f(x) = \frac{1}{x} \qquad = 1$$

$$f'(x) = -\frac{1}{x^2} \qquad = -1$$

$$f''(x) = \frac{2}{x^3} \qquad = 2$$

$$f'''(x) = \frac{-6}{x^4} \qquad = -6$$

$$f^{(4)}(x) = \frac{24}{x^5} \qquad = 24$$

$$f^{(5)}(x) = \frac{-120}{x^6} \qquad = -120$$

$x = 1$

$$T_4(x) = f(x_0) + f'(x_0)\cdot(x-x_0) + \frac{f''(x_0)}{2!}\cdot(x-x_0)^2 +$$

$$+\frac{f'''(x_0)}{3!}\cdot(x-x_0)^3 + \frac{f^{IV}(x_0)}{4!}\cdot(x-x_0) =$$

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

$$+\frac{\cancel{24}}{\cancel{4!}}\cdot(x-1)^4 = \underline{\underline{x^4 - 5x^3 + 10x^2 - 10x + 5}}$$

$$R_4(x) = \frac{f^{(5)}(c)}{5!} \cdot (x - x_0)^5 =$$

$$= \frac{\frac{-\cancel{120}^{\,-1}}{c^6}}{\cancel{120}_{\,1}} \cdot (x-1)^5 = \underline{\underline{-\frac{1}{c^6} \cdot (x-1)^5}}$$

c mezi 1, x

$\uparrow$

x_0