øving 9 MA

1 $\dfrac{\log_a x}{\frac{1}{x}} = \log_a(x) \cdot x = \dfrac{x \cdot \ln(x)}{\ln(a)} = \dfrac{\ln(x^x)}{\ln(a)}$

2 $\log_1(x)$ er lore definer for $x=1$ fordi $1^x = 1$, uansett

og $\log_1(x) = \dfrac{\ln(x)}{\ln(1)} = \dfrac{\ln(x)}{0}$, fordi deler er ikke definert i verdi

$\log_1(x) \in \emptyset$

$f(-1) = 0$ $\quad \lim_{x \to 1+} f(x) = 4$ $\quad f'(-1) = 0$

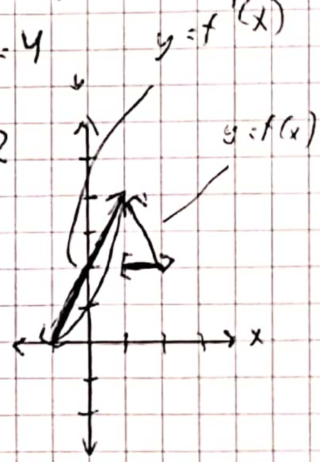
$f(0) = 1$ $\quad f(2) = 2$ $\quad f'(0) = 2$

$\lim_{x \to 1-} f(x) = 4$ $\quad \lim_{x \to 1-} f'(x) = 4$

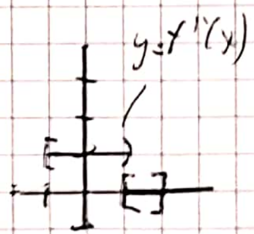
$\lim_{x \to 1+} f'(x) = -2$

$f'(2) = -2$

3 $f(x) \begin{cases} (x+1)^2, & x < 1 \\ -2x+6, & x \geq 1 \end{cases}$



$f'(x) = \begin{cases} 2(x+1), & x < 1 \\ -2, & x \geq 1 \end{cases}$



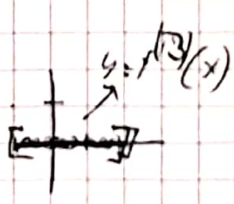
$f''(-1) = 2$

$f''(x) = \begin{cases} 2, & x < 1 \\ 0, & x \geq 1 \end{cases}$ $\quad f''(0) = 2$

$\lim_{x \to 1-} f''(x) = 2$

$f'''(x) = 0$

$f'''(x) = \begin{cases} 0, & x < 1 \\ 0, & x \geq 1 \end{cases} = 0 \quad \lim_{x \to 1+} f''(x) = 0$



$f^{(3)} = 0$

ikke de derivert for $f^{(n)}(x)$ for $n \geq 3$

~~De~~ $f'(1)$ og $f''(1)$ $\quad$ når $n \geq 3$ er $f^{(n)}(x) = 0$

er definert i $x=1$, men ikke kontinuerlig

4

$$f(x) = (\ln(x))^{3x}$$

$$\left(\ln(f(x)) = \ln(3x\ln(x))\right)\frac{d}{dx}$$

$$\frac{f'(x)}{f(x)} = \frac{}{\cancel{dx}}$$

4

$$f(x) = (\ln(x))^{3x}$$

$$\left(\ln(f(x)) = 3x\ln(\ln(x))\right)\frac{d}{dx}$$

$$\frac{f'(x)}{f(x)} = \left(3x\ln(\ln(x))\right)\frac{d}{dx}$$

$U = 3x \qquad V = \ln(\ln(x))$

$U' = 3 \qquad V' \cancel{= \ln(\ln(x))} \cdot x$

$$\left(3x\ln(\ln(x))\right)\frac{d}{dx} = \underset{U'V+UV'}{} \qquad V'(x) = \ln(U)\cdot U'$$

$$= \frac{1}{\ln(x)}\cdot\frac{1}{x} = \frac{1}{x\ln(x)}$$

$$\Downarrow$$

$$3\ln(\ln(x)) + 3x\left(\frac{1}{x\ln(x)}\right) = 3\ln(\ln(x)) + \frac{3}{\ln(x)} = 3\left(\ln(\ln(x)) + \frac{1}{\ln(x)}\right)$$

$$\frac{f'(x)}{f(x)} = 3\left(\ln(\ln(x)) + \frac{1}{\ln(x)}\right)$$

$f(x) = \ln(x)^{3x}$

$$f'(x) = 3\left(\ln(\ln(x)) + \frac{1}{\ln(x)}\right)\ln(x)^{3x}$$

$$f'(x) = 3\ln(\ln(x))\cdot\ln(x)^{3x} + \frac{3\ln(x)^{3x}}{\ln(x)}$$

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5

$$y^2 + y + x^4 + 3x - 4 = 0$$

$f(1) = -1$

$$\cancel{1 - 1 +} 1 + 3 - 4 = 0 \quad L$$

$$\cancel{\left(y(y+1) + x^4 + 3x - 4 = 0 \right)} \Big| \frac{d}{dx}$$

$$\cancel{y\frac{d}{dx}\left(y\frac{d}{dx} + 1\right) + 4x^3 + 3 = 0}$$

$$\left(y^2 + y = 4 - 3x - x^4 \right) \Big| \frac{d}{dx}$$

$$2y\frac{d}{dx} + \frac{d}{dx} = 3 - 4x^3$$

$$y = -1$$
$$x = 1$$

$$\frac{d}{dy}(2y + 1) = 3 - 4x^3$$

$$\frac{d}{dy}(-2 + 1) = 3 - 4$$

$$\frac{d}{dy}(-1) = -1$$

$$\frac{d}{dy} = 1$$

$$\cancel{a = a}$$

$$y = g(x) = ax + b$$

$$-1 = 1 \cdot 1 + b$$

$$b = -2$$

$$y = g(x) = 1 \cdot x - 2$$

$$\underline{\underline{y = g(x) = x - 2}}$$

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1

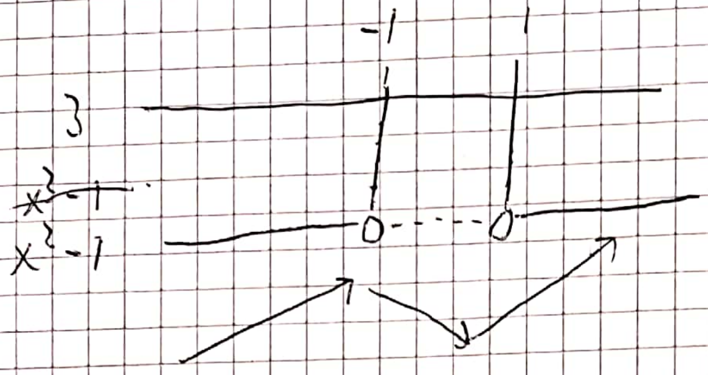
$f(x) = x^3 - 3x + 2$

$f'(x) = 3x^2 - 3 = 3(x^2 - 1)$

$x^2 - 1 = 0$

$x^2 = 1$

$x = \pm\sqrt{1}$



Lokal TP: -1 siden grafen vokser fra $(1, \infty)$ er det ingen globale TP

Lokal BP: 1 siden grafen vokser fra $(-\infty, -1)$ er den ingen globale BP

$f(+1) = 1 - 3 + 2 = 0$, L.BP: $(+1, 0)$

$f(-1) = -1 + 3 + 2 = 4$, L.TP: $(+4, -1)$

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