Matte 1 gruppe

7 $f(x) = \frac{1}{2}x^3 - 7x + 22$

$f'(x) = \frac{3}{2}x^2 - 7$

$f''(x) = 3x$

$f'''(x) = 3$

$f''''(x) = 0$

$f'''''(x) = 0$

$\vdots$

$f^{(100)'}(x) = 0$

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

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

2.) $g(x) = \frac{1 + \sin(x)}{1 + e^x + x^2}$ $\frac{u'v - uv'}{v^2}$ $u' = \cos(x)$ $v' = e^x + 2x$

$g'(x) = \frac{\cos(x)(1 + e^x + x^2) - (1 + \sin(x))(e^x + 2x)}{(1 + e^x + x^2)^2}$

$g'(x) = \frac{\cos(x)(1 + e^x + x^2) - (1 + \sin)(e^x + 2x)}{(1 + e^x + x^2)^2}$

2 | 3.)

$h(x) = \sqrt{1+\sqrt{x}}$ $\quad U = 1+\sqrt{x}$ $\quad U' = -\frac{1}{2\sqrt{x}}$

~~$h'(x) = \sqrt{U}$~~

$h(x) = \sqrt{1+\sqrt{x}}$ $\quad U = 1+\sqrt{x}$ $\quad U' = \frac{1}{8\sqrt{x}}$ $\quad h'(x) = f(U)\cdot U'$

$h'(x) = \sqrt{U}\cdot\left(-\frac{1}{2\sqrt{x}}\right) \frac{d}{dU}$

$h'(x) = \frac{1}{2\sqrt{1+\sqrt{x}}}\cdot\left(\frac{1}{2\sqrt{x}}\right) = \frac{1}{4\sqrt{x}\sqrt{1+\sqrt{x}}} = \frac{1}{4\sqrt{x+1+\sqrt{x}}}$

3

$f(t) = \frac{t^2-1}{t+1} + 6t^{\frac{1}{3}} + \sqrt{\sin t} + 4^t$

$f(t) = \frac{\cancel{(t+1)}(t-1)}{\cancel{(t+1)}} + 6t^{\frac{1}{3}} + \sqrt{\sin(t)} + 4^t \quad , t \neq -1$

$(U = \sin(t))$

$f'(t) = 1 + 2t^{\frac{1}{3}-\frac{3}{3}} + \left(\sqrt{U}\right)\frac{d}{dt}\cdot U'\frac{d}{dt} + \left(e^{t\ln 4}\right)\frac{d}{dt}$ — " —

$f'(t) = 1 + 2t^{-\frac{2}{3}} + \frac{1}{2\sqrt{\sin t}}\cdot\cos(t) + 4^t\cdot\ln 4)$ — " —

$f'(t) = 2t^{-\frac{2}{3}} + \frac{\cos(t)}{2\sqrt{\sin(t)}} + 4^t\cdot\ln 4 + 1 \quad , t \neq -1$

$a = x$

4

$\log_e(2) = \ln(2)$, $a_0 = 5$

$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$

$e^x = 2$ $\quad f(x) = e^x - 2$ $\quad x_{0+1} = 5 - \frac{f(5)}{f'(5)}$

$\ln(e^x) = \ln(2)$ $\quad f'(x) = e^x$

$x = \ln(2)$

$e^x - 2 = 0$

$x_1 = 4{,}01347$
$x_2 = 3{,}048616$
$x_3 = 2{,}144370$
$x_4 = 1{,}378654$
$x_5 = 0{,}882491$
$x_6 = 0{,}709992\ldots$
$x_7 = 0{,}693218\ldots \approx 0{,}693$
$\ln(2) = 0{,}69314\ldots \approx 0{,}693$

Jeg må ta 7 steg for å skrive ln(2) med startpunkt 5 for å få korrekt med 3 desimaler

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5 $a>0 \quad a\neq 1$

$$\frac{d}{dx}a^x = a^x \ln(a)$$

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

$$f(x) = \cancel{\log_a(x)} = \log_a(x)$$

$$(f^{-1})'(x) = \frac{1}{f'(f(y))} = \frac{1}{f'(\log_a(y))}$$

$\cancel{f(x)} =$

$$f(x) = \log_a(y)$$

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

$$\log_a(x)' = \frac{\ln(x)}{\ln(a)}$$

$$\frac{f'(x)}{f(x)} = \frac{\log_a(x)'}{\log_a(x)} = \frac{1}{x\cdot\ln(a)\cdot\log_a(x)} = \frac{1}{x\cdot\ln(a)}$$

$$f'(x) = \frac{1\cdot\cancel{f(x)}}{x\cdot\ln(x)\cdot\cancel{\log_a(x)}} \quad (f(x) = \log_a(x)$$

$$f'(x) = \frac{1}{x\ln(a)}$$

$$(f^{-1})'(x) = \frac{1}{f'(f(y))} = \frac{1}{f'(y\ln(a))} = \frac{1}{\frac{1}{y\ln(a)\cdot\ln(a)}}$$

$y(\ln(a))^2$