LF test 3.02.2020

1) * $(-2e^{3x})' = -2(e^{3x})'$

$= -2\,e^{3x}\cdot(3x) = \underline{-6e^{3x}}$

* $\frac{1}{(e^{x})^{6}} = \frac{1}{e^{6x}} = (e^{6x})^{-1} = e^{-6x}$

$(e^{-6x})' = e^{-6x}(-6x)' = \underline{-6e^{-6x}}$

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

$e^{-4}(x\,e^{-3x\cancel{-4}})' = e^{-4}[(x)'\,e^{-3x\cancel{-4}} + x(e^{-3x})']$

$= e^{-4}[1\,e^{-3x} + x\,e^{\cancel{0}-3x}(-3x)']$

$= e^{-4}(e^{-3x} + (-3)\cdot x\,e^{-3x})$

$= \underline{e^{-4}(1-3x)e^{-3x}}$

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

$= e^{(x^{3}+3x+2-(x^{2}-4x+2))}$

$= e^{x^{3}-x^{2}+7x}$

$(e^{x^{3}-x^{2}+7x})' = e^{x^{3}-x^{2}+7x}\underbrace{(x^{3}-x^{2}+7x)'}_{3x^{2}-2x+7}$

$= \underline{(3x^{2}-2x+7)\,e^{x^{3}-x^{2}+7x}}$

3) $10^y = 13$

$\text{Log } 10^y = \text{Log } 13$

$y \text{ Log } 10 = \text{Log } 13$

så $y = \dfrac{\text{Log } 13}{\text{Log } 10}$

$7 = 2^?$

* $8 = 2^3$, $\sqrt[3]{2} = 2^{1/3}$ $4^3 = (2^2)^3 = 2^6$

$$(2^3)^x = \frac{2^{1/3} \cdot 2^6 \cdot 7}{2^{3/2}}$$

$$= \underbrace{2^{\frac{1}{3}} \cdot 2^6 \cdot 2^{-3/2}} \cdot 7$$

$$= 2^{6+\frac{1}{3}-\frac{3}{2}} \cdot 7$$

$$= 2^{6-\frac{7}{6}} \cdot 7 = 2^{5-\frac{1}{6}} \cdot 7$$

$$\frac{2^{3x}}{2^{5-\frac{1}{6}}} = 2^{3x} \cdot 2^{-5+\frac{1}{6}} = 7$$

$$2^{3x-5+\frac{1}{6}} = 7$$

Anvender Log

$$3x - 5 + \frac{1}{6} = \frac{\text{Log } 7}{\text{Log } 2}$$

$$x = \frac{1}{3}\left[\frac{\text{Log } 7}{\text{Log } 2} + 5 - \frac{1}{6}\right]$$

4) $(x^r)' = r x^{r-1}$

$(x^3)' = 3x^2$

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

så den deriverte til $\frac{1}{3}x^3$ er x^2.

* $g'(x) = -3x+2$ $\qquad \left(\left(\frac{x^2}{2}\right)' = x \quad (x)' = 1 \right)$

En mulighet: $g(x) = -\frac{3}{2}x^2 + 2x$

Hvis $g_1'(x) = g_2'(x) = -3x+2$,

da er $(g_1(x) - g_2(x))' = 0$

så $g_1 - g_2$ er konstant!

$g(x) = -\frac{3}{2}x^2 + 2x + c$ alle mulige funksjoner

$c \in \mathbb{R}$

slik at $g'(x) = -3x+2$.

5. $f(x) = x \cdot 10^{-x} = x\left(e^{\ln 10}\right)^{-x} = x e^{-\ln 10 \cdot x}$

$f'(x) = (x)' e^{-\ln 10 x} + x\left(e^{-\ln 10 \cdot x}\right)'$

$= (1 - x \cdot \ln 10)\, e^{-\ln 10 \cdot x}$

stiger $0 \le x \le \frac{1}{\ln 10}$

synker $x \ge \frac{1}{\ln 10}$

maksimumspunkt for $x = \frac{1}{\ln 10} \sim \frac{1}{2.3}$.

minimumspunkt: endepunktet $x = 0$