RP. 166. f) Derivera

$$f(x) = e^{3\sqrt{1-2x^2}}$$

$$\Rightarrow f'(x) = e^{3\sqrt{1-2x^2}} \cdot 3 \cdot \frac{1}{\cancel{2}\sqrt{1-2x^2}} \cdot (-\cancel{4}^{2} x)$$

$$= \frac{-6x \cdot e^{3\sqrt{1-2x^2}}}{\sqrt{1-2x^2}}$$

RP. 170. b) Bestäm y' i punkten $(2,3)$ på ellipsen $9x^2+4y^2=72$

Kontroll:

$$9\cdot 2^2 + 4\cdot 3^2 = 9\cdot 4 + 4\cdot 9 = 8\cdot 9 = 72$$

ok

Derivera:

$$\frac{d}{dx}\left(9x^2+4y^2\right) = \frac{d}{dx}(72) = 0$$

$$0 = 18x + 8y\cdot y'$$

$$\Rightarrow y' = \frac{-18x}{8y} = -\frac{9x}{4y}$$

$$= -\frac{\cancel{9}^{3}\cdot \cancel{2}^{1}}{\cancel{4}_{2}\cdot \cancel{3}_{1}} = -3/2$$

RP. 169. b) Bestäm y'

$$2xy^2 - y^4 + 1 = 0$$

$$\Rightarrow \frac{d}{dx}\left(2xy^2 - y^4 + 1\right) = \frac{d}{dx}(0) = 0$$

$$2y^2 + 2x\cdot 2y y' - 4y^3\cdot y' = 0$$

$$2y^2 + (4xy - 4y^3)\cdot y' = 0$$

$$y' = \frac{\cancel{2}y^{\cancel{2}}}{{}_{2}\cancel{4}y^{\cancel{3}2} - {}_{2}\cancel{4}x\cancel{y}}$$

$$= \frac{y}{2y^2-2x}$$

RP. 174.i) Bestäm lokala max, min, största, minsta värde

$$f(x) = x + \ln x - 2\ln(x-1),$$

notera: $\begin{cases} x > 0 \\ x-1 > 0 \end{cases} \Rightarrow \underline{\underline{x > 1}}$.

(i) Kritiska punkter

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

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

$$1 + \frac{x-1-2x}{x\cdot(x-1)} = 0$$

$$1 - \frac{x+1}{x(x-1)} = 0$$

$$x+1 = x\cdot(x-1) = x^2 - x$$

$$x^2 - 2x - 1 = 0$$

$$x = 1 \pm \sqrt{1+1} = \underline{1 (\pm) \sqrt{2}}$$

Ty $3 - 2\sqrt{2} < 1$

$\Leftrightarrow 2 < 2\sqrt{2}$

$\Leftrightarrow 1 < \sqrt{2}$ $\underline{\underline{ok}}$

$\underline{\underline{\text{Notera!}}}$ Ej lösning ty uppfyller ej $\underline{\underline{x>1}}$

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

$$\left(f''(1-\sqrt{2}) = -\frac{1}{(1-\sqrt{2})^2} + \frac{2}{(\cancel{1}-\sqrt{2}-\cancel{1})^2} = -\frac{1}{1+2-2\sqrt{2}} + \frac{2}{2} = 1 - \frac{1}{3-2\sqrt{2}} < 0 \right)$$

$$f''(1+\sqrt{2}) = -\frac{1}{(1+\sqrt{2})^2} + \frac{2}{(\cancel{1}+\sqrt{2}-\cancel{1})^2} = -\frac{1}{1+2+2\sqrt{2}} + \frac{2}{2} = 1 - \frac{1}{3+2\sqrt{2}} > 0$$

Lokalt min

(ii) Punkter där $f'(x)$ ej är definierad

Saknas för $x > 1$

(iii) Randpunkter : $x = 1$, $x = \infty$

"$f(1) = +\infty$"

"$f(\infty) = \lim_{x\to\infty} x + \ln x - 2\ln(x-1)$

$\geq \lim_{x\to\infty} \{x - 2\ln(x-1)\} = \infty$, ty x dominerar $\ln x$

∴ Lokalt min : $f(1+\sqrt{2}) = 1+\sqrt{2} + \ln\left(\frac{1+\sqrt{2}}{2}\right)$

Globalt min : ——— " ———

Lokalt max : Saknas

Globalt max : Saknas