

# MA0001 Øving 6 Sander Lindberg

Gruppe 3

## Oppgave 1.

$$f(x) = \frac{1}{\sqrt{2}x}$$

$$\begin{aligned} \frac{d}{dx} \left( \frac{1}{\sqrt{2}x} \right) &= \frac{d}{dx} \left( \frac{1}{\sqrt{2}} \cdot \frac{1}{x} \right) = \frac{1}{\sqrt{2}} \frac{d}{dx} \left( x^{-1} \right) \\ &= \frac{1}{\sqrt{2}} \cdot \left( -\frac{1}{x^2} \right) = \frac{1}{\sqrt{2}} \cdot -\frac{1}{2x^2} = -\frac{1}{\sqrt{2} \cdot 2x^2} \end{aligned}$$

## Oppgave 2.

$$g(x) = \begin{cases} \frac{x^2 - x}{x^2 - 1} & \text{for } x \neq 1 \\ \frac{1}{2} & \text{for } x = 1 \end{cases}$$

Må vise at  $\lim_{x \rightarrow 1} \frac{x^2 - x}{x^2 - 1} = \lim_{x \rightarrow 1} \frac{1}{2} = \frac{1}{2}$ .

$$\lim_{x \rightarrow 1} \frac{x^2 - x}{x^2 - 1} = \frac{\frac{d}{dx}(x^2 - x)}{\frac{d}{dx}(x^2 - 1)} = \frac{2x - 1}{2x} \quad \left| \text{Bruker L'Hôpital} \right|$$

$$\lim_{x \rightarrow 1} \frac{2x - 1}{2x} = \frac{1}{2}$$

En funksjon er kontinuerlig dersom  $\lim_{x \rightarrow c} f(x) = f(c)$ .

Jeg har her vist dette.  $c=1$

$$\lim_{x \rightarrow 1} g(x) = g(1)$$

$$g(1) = \frac{2 \cdot 1 - 1}{2 \cdot 1} = \frac{1}{2}$$

$$g(1) = \frac{1}{2} = \frac{1}{2}$$

Oppgave 3.

$$h(x) = (1+x)(1+\sqrt{x})(x^2+1)$$

Braker produktregelen med  $u = (1+\sqrt{x})$  og  $v = (1+x)(1+x^2)$ .

$$\frac{d}{dx}(u \cdot v) = \frac{d}{dx}(u) \cdot v + u \cdot \frac{d}{dx}(v) :$$

$$\frac{d}{dx}(u) = \frac{1}{2\sqrt{x}} , \quad \frac{d}{dx}(v) = \frac{d}{dx}((1+x)(1+x^2)) = \frac{d}{dx}(1+x^2) \cdot (1+x) \\ = (1+x^2) + 2x(1+x).$$

$$\frac{d}{dx}(u \cdot v) = \frac{1}{2\sqrt{x}} \cdot (1+x)(1+x^2) + (1+\sqrt{x}) \cdot ((1+x^2) + 2x(1+x)) \\ = \frac{(1+x)(1+x^2)}{2\sqrt{x}} + (1+\sqrt{x})(1+x^2) + 2(1+\sqrt{x})x(1+x)$$