MA0001 Øving 6 Sander Lindberg

Gruppe 3

Oppgave 1.

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

$$\frac{d}{dx}\left(\frac{1}{\sqrt{2x}}\right) = \frac{d}{dx}\left(\frac{1}{\sqrt{2}\sqrt{x}}\right) = \frac{1}{\sqrt{2}}\frac{d}{dx}\left(x^{-\frac{1}{2}}\right)$$

$$= \frac{1}{\sqrt{2}} \cdot \left(-\frac{1}{2}x^{-\frac{3}{2}}\right) = \frac{1}{\sqrt{2}} \cdot -\frac{1}{2x^{\frac{3}{2}}} = -\frac{1}{\sqrt{2} \cdot 2x^{\frac{3}{2}}}$$

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 $\lim\limits_{x \to 1} \frac{x^2 - x}{x^2 - 1} = \lim\limits_{x \to 1} \frac{1}{2} = \frac{1}{2}$.

$$\lim_{x \to 1} \frac{x^2 - \cancel{x}}{x^2 - 1} = \frac{\frac{d}{dx}(x^2 - x)}{\frac{d}{dx}(x^2 - 1)} = \frac{2x - 1}{2x}$$

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

En funksjon er kontinuerlig dersom $\lim\limits_{x \to c} f(x) = f(c)$.

Jeg har her vist dette. $c = 1$

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

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

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

Oppgave 3.

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

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

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

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

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