

# Oppgave 6

IMAT1001, 06.01.2022, 10086

$$1) \lim_{x \rightarrow 1} \frac{\sqrt{x} - x}{\sin\left(\frac{\pi}{2}x\right) - x^2} \rightarrow \frac{1-1}{1-1} \rightarrow \left[ \frac{0}{0} \right]$$

L'H

$$\lim_{x \rightarrow 1} \frac{\frac{1}{2}x^{-\frac{1}{2}} - 1}{\frac{\pi}{2}\cos\left(\frac{\pi}{2}x\right) - 2x} \rightarrow \frac{\frac{1}{2} - 1}{0 - 2} \rightarrow \frac{-\frac{1}{2}}{-2} \rightarrow \underline{\underline{\frac{1}{4}}}$$

Når  $x \rightarrow 1$  konvergerer uttrykket mot  $\underline{\underline{\frac{1}{4}}}$

$$11) \int 6x^2 \cdot \arctan(x^3+1) dx$$

$$= 6 \int x^2 \arctan(x^3+1)$$

$\uparrow$   
 $u'$

$\uparrow$   
 $v$

$$u' = x^2$$

$$u = \frac{1}{3}x^3$$

$$v = \arctan(x^3+1)$$

$$v' = \frac{1}{1+(x^3+1)^2} \cdot 3x^2$$

$$= \frac{3x^2}{x^6+2x^3+2}$$

$$6 \left[ \frac{1}{3} x^3 \arctan(x^3+1) - \int \frac{1}{3} x^3 \frac{3x^3}{x^6+2x^3+2} dx \right]$$

$$6 \left[ -11 - \int \frac{x^5}{x^6+2x^3+2} dx \right]$$

$$u = x^6 + 2x^3 + 2$$

$$\frac{du}{dx} = 6x^5 + 6x^2$$

$$dx = \frac{1}{6x^2(x^3+1)}$$