TMA 4100 Skrifting innlevering 1

1

$$\cdot -1 \leq \cos\left(\frac{\pi}{x-2}\right) \leq 1$$

$$\lim_{x\to 2} -1\cdot(x-2)^2 \leq \lim_{x\to 2}(x-2)^2\cdot\cos\left(\frac{\pi}{x-2}\right) \leq \lim_{x\to 2} 1\cdot(x-2)^2$$

$$0 \leq \lim_{x\to 2}(x-2)^2\cdot\cos\left(\frac{\pi}{x-2}\right) \leq 0$$

$$\lim_{x\to 2}(x-2)^2\cdot\cos\left(\frac{\pi}{x-2}\right) = 0$$

$\underline{A = a}$

2. $x^3 + y^3 = 6xy \Rightarrow \frac{d}{dx}(x^3+y^3) = \frac{d}{dx}(6xy)$

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

$$3y^2\frac{dy}{dx} - 6x\frac{dy}{dx} = 6y - 3x^2$$

$$\frac{dy}{dx}(3y^2 - 6x) = 6y - 3x^2$$

$$\underline{\frac{dy}{dx} = \frac{6y-3x^2}{3y^2-6x}} \leftarrow (3,3)$$

$$\frac{dy}{dx} = \frac{6\cdot 3 - 3\cdot 9}{3\cdot 9 - 6\cdot 3} = -1$$

$y = ax + b$

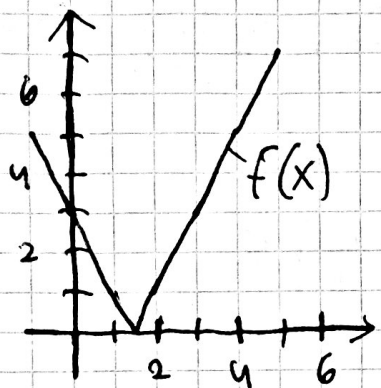
$3 = (-1)\cdot 3 + b$

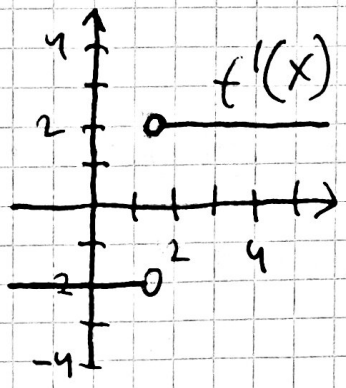
$6 = b$

$\underline{y = -x + 6}$

3

$$f(x)=|2x-3| \Rightarrow f'(x)=2\,\frac{2x-3}{|2x-3|}=\frac{4x-6}{|2x-3|}$$





4 $\quad -1 \le \sin\frac{1}{x} \le 1$

$$\lim_{x\to 0} -\ln(1+\sqrt{|x|}) \le \lim_{x\to 0} \ln(1+\sqrt{|x|})\cdot\sin\left(\tfrac{1}{x}\right) \le \lim_{x\to 0} \ln(1+\sqrt{|x|})$$

$$0 \le \lim_{x\to 0} \ln(1+\sqrt{|x|})\cdot\sin\left(\tfrac{1}{x}\right) \le 0$$

$$\lim_{x\to 0} \ln(1+\sqrt{|x|})\cdot\sin\left(\tfrac{1}{x}\right)=0 \quad \text{Q.E.D.}$$