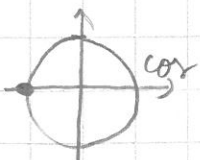
19,21 $f(x) = \dfrac{5}{4 + 3\underbrace{\cos 2x}_{-1 \le \downarrow \le 1}}$ nimittäjän pienin arvo: $4 + 3\cdot(-1) = 1$

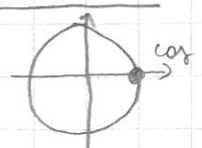
$\Rightarrow$ nimittäjä $\neq 0$ aina $\Rightarrow x \in \mathbb{R}$

suurin arvo: $\dfrac{5}{4+3\cdot(-1)} = \dfrac{5}{1} = \underline{5}$ kun $\cos 2x = -1$



$\Leftrightarrow 2x = \pi + n2\pi \mid :2 \Leftrightarrow x = \frac{\pi}{2} + n\pi,\ n \in \mathbb{Z}$

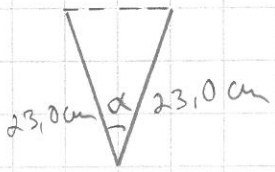
pienin arvo: $\dfrac{5}{4+3\cdot 1} = \underline{\dfrac{5}{7}}$ kun $\cos 2x = 1$



$\Leftrightarrow 2x = n2\pi \mid :2 \Leftrightarrow x = n\pi,\ n \in \mathbb{Z}$

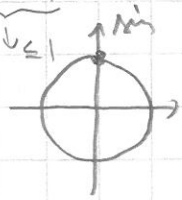
20. Suorakulmaisen kolmion sini- ja kosinifunktioista

20,4



pinta-ala: $A(\alpha) = \frac{1}{2}\cdot 23{,}0\text{ cm}\cdot 23{,}0\text{ cm}\cdot \underbrace{\sin\alpha}_{0 \le \downarrow \le 1}$

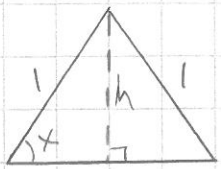
$A(\alpha)$ on suurin kun $\sin\alpha = 1 \Rightarrow \underline{\alpha = 90°}$



jollon tilavuus: $V = A\cdot h = \frac{1}{2}\cdot 2{,}30\text{ dm}\cdot 2{,}30\text{ dm}\cdot 30\text{ dm}$

$= 79{,}35\text{ dm}^3 \approx \underline{79\text{ l}}$

20.8



$\begin{cases} \sin x = \frac{h}{1} = h \\ \cos x = \frac{y}{1} = y \end{cases}$

a) Pinta-ala: $\underline{A(x) = \frac{1}{2}\cdot 2y\cdot h = yh = \cos x\cdot \sin x}$

b) $A(x) = \cos x\cdot \sin x = \frac{1}{2}\cdot \underbrace{2\sin x\cos x}_{\sin 2x} = \frac{1}{2}\underbrace{\sin 2x}_{0 \le \downarrow \le 1}$

suurin arvo: $\frac{1}{2}\cdot 1 = \frac{1}{2}$ kun $2x = 90° \mid :2 \Leftrightarrow \underline{x = 45°}$

Tällöin kanta: $2y = 2\cos x = 2\cdot\cos 45° = 2\cdot\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{\frac{2}{2}}$

$= \frac{2\sqrt{2}}{2} = \underline{\sqrt{2}}$