Øving 1 (på nytt igjen ja).

Oppgave 1 a)

Sann verdi = forventningsverdi = 10

Feil = 2, stokastiske, normalfordelte, type A.

b)
- Histogram
- QQ-plot
- Shapiro-Wilk test (SW test)
- AD test.

c) Den mest sannsynlige "sanne" verdien i målingene er forventningsverdien, snittet.

d) $\mathcal{N}_x \in \left[m_x \pm t_p \frac{s_x}{\sqrt{n}} \right]$, $m_x = \frac{1}{n} \sum_{i=1}^{N} x_i$, $s_x = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} (x_i - m_x)^2}$ $n = 30 - 1 = 29$ frihetsgrader.

Oppgave 2 a)

$A = B + C$, $B \in \mathcal{N}_B \pm \sigma_B$, $C \in \mathcal{N}_C \pm \sigma_C$, $\sigma_A^2 = \sigma_B^2 + \sigma_C^2 \Rightarrow \sigma_A = \sqrt{\sigma_B^2 + \sigma_C^2}$

d) $\sigma_A = \sqrt{\sigma_B^2 + \sigma_C^2} = \sqrt{\left(\frac{b-a}{3}\right) + \left(\frac{b-a}{3}\right)}$

Oppgave 3

$m_k = m_{mk} - m_{uk}$

a) $m_{mk} = 90 \pm 0.05$, $m_{uk} = 72.2 \pm 0.05$

$|\Delta m_k| = \left| \frac{\partial m_k}{\partial m_{mk}} \Delta m_{mk} \right| + \left| \frac{\partial m_k}{\partial m_{uk}} \Delta m_{uk} \right| = 0.05 + 0.05 = \underline{0.1 \text{ kg}}$

b) $$\sigma_{m_k}^2 = \sum \sigma_{m_i}^2 \left(\frac{\partial m_k}{\partial m_i}\right)^2$$

$$= \sigma_{m_{mk}}^2 \cdot (1)^2 + \sigma_{m_{uk}}^2 \cdot (-1)^2$$

$$= \sigma_{m_{mk}}^2 + \sigma_{m_{uk}}^2 = 2\left(\frac{0.05+0.05}{\sqrt{12}}\right)^2$$

$$\rightarrow \sigma_{m_k} = \sqrt{2\left(\frac{0.1}{\sqrt{12}}\right)^2} = \underline{\underline{0.04}}$$

<u>Oppgave 4 a)</u>

$$\alpha = \frac{24 \ln 10 V}{cS}\left(\frac{1}{T60_{med}} - \frac{1}{T60_{uten}}\right) \qquad \frac{dx^{-1}}{dx} = -x^{-2}$$

$$\sigma_\alpha^2 = \sigma T60_{med}^2 \cdot \left(-\frac{24 \ln 10 V}{cS} \cdot \frac{1}{T60_{med}^2}\right)^2 + \sigma_{T60_{uten}}^2 \cdot \left(\frac{24 \ln 10 V}{cS} \cdot \frac{1}{T60_{uten}^2}\right)^2$$

$$= \left(\frac{24 \ln 10 V}{cS}\right)^2 \left(\frac{\sigma_{T60med}^2}{T60_{med}^2} + \frac{\sigma_{T60uten}^2}{T60_{uten}^2}\right)$$

$$\sigma_\alpha = \sqrt{\sigma_\alpha^2}$$

b) $m_{xm} = 3{,}55$, $m_{xu} = 4.153$, $S_{T,m}^2 = 0.115$, $S_{T,u}^2 = 0.0321$

$S_\alpha = \cdots = 0.1112$.

c) 95 % konfidensintervall for α, $p = 5\%$

$$\alpha \in m_\alpha \pm t_p \frac{S_\alpha}{\sqrt{n}} = 0.157 \pm 2.3 \cdot \frac{0.1112}{\sqrt{8}} = 0.157 \pm 0.093$$