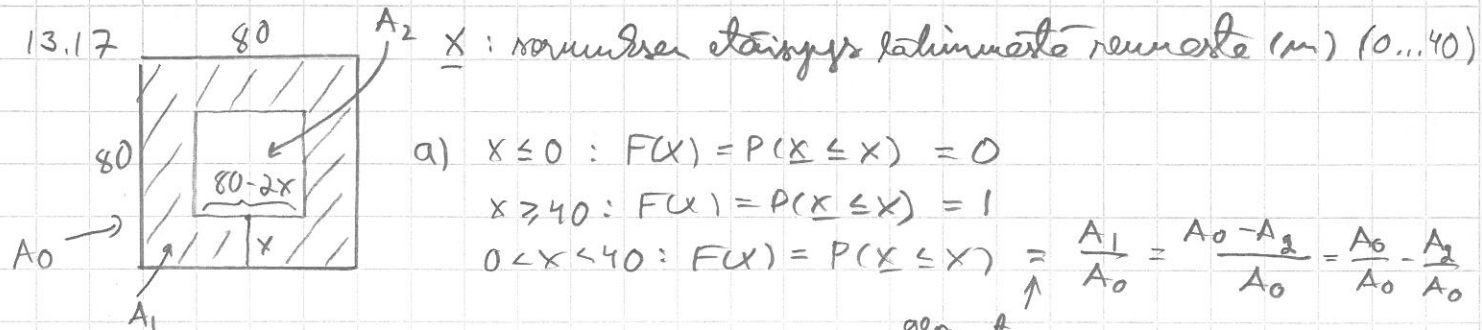


13.17



$$a) \quad x \leq 0 : F(x) = P(X \leq x) = 0$$

$$x \geq 40 : F(x) = P(X \leq x) = 1$$

$$0 < x < 40 : F(x) = P(X \leq x) = \frac{A_1}{A_0} = \frac{A_0 - A_2}{A_0} = \frac{A_0}{A_0} - \frac{A_2}{A_0}$$

$$\begin{aligned} & \text{geom. tr} \\ & = 1 - k^2 = 1 - \left(\frac{80-2x}{80}\right)^2 = 1 - \left(1 - \frac{x}{40}\right)^2 \\ & = 1 - \left(1 - 2 \cdot \frac{x}{40} + \left(\frac{x}{40}\right)^2\right) = \frac{1}{20}x - \frac{1}{1600}x^2 \end{aligned}$$

$$\Gamma_{TAH}: A_1 = 80 \cdot x \cdot 2 + (80-2x) \cdot x \cdot 2$$

$$\Rightarrow F(x) = \begin{cases} 0 & , x \leq 0 \\ \frac{1}{20}x - \frac{1}{1600}x^2 & , 0 < x < 40 \\ 1 & , x \geq 40 \end{cases}$$

$$b) \quad f(x) = F'(x) = \begin{cases} \frac{1}{20} - \frac{1}{800}x & , 0 < x < 40 \\ 0 & , \text{muualle} \end{cases}$$

$$c) \quad E(X) = \int_{-\infty}^{\infty} x f(x) dx = \int_0^{40} x \left(\frac{1}{20} - \frac{1}{800}x\right) dx = \dots = \frac{40}{3} \approx 13,3(m)$$

$$\begin{aligned} d) \quad P(X \geq 35) &= 1 - P(X \leq 35) = 1 - F(35) = 1 - \left(\frac{1}{20} \cdot 35 - \frac{1}{1600} \cdot 35^2\right) \\ &= \frac{1}{64} \approx 0,0156 \end{aligned}$$

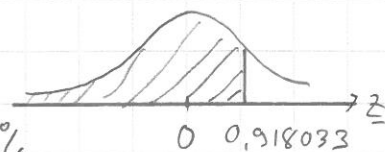
17. Normalijakumman taulukko

17.2 $\underline{x}$: monolauriston (14-vuotiax) pituus (cm), $\underline{x} \sim N(162,4; 6,1)$

$$a) \quad x = 168,0 \Rightarrow z = \frac{x - \mu}{\sigma} = \frac{168,0 - 162,4}{6,1} \approx 0,918033 \approx 0,92$$

$$P(\underline{x} < 168,0) = P(\underline{z} < 0,918033)$$

$$\begin{aligned} & \sim N(0,1) \quad \text{maad} \\ & = \Phi(0,918033) \approx 0,8212 \approx 82\% \end{aligned}$$



$$P(\underline{x} > 168,0) = 1 - P(\underline{x} \leq 168,0) = 1 - 0,8212 = 0,1788 \approx 18\%$$

$$b) \quad P(\underline{x} < 155,0) = P\left(\frac{\underline{x} - 162,4}{6,1} < \frac{155,0 - 162,4}{6,1}\right) = P(\underline{z} < -1,213115)$$

symmetria

$$= P(\underline{z} > 1,213115) = 1 - P(\underline{z} \leq 1,213115)$$

$$= 1 - \Phi(1,213115) \approx 1 - 0,8869 = 0,1131 \approx 11\%$$

