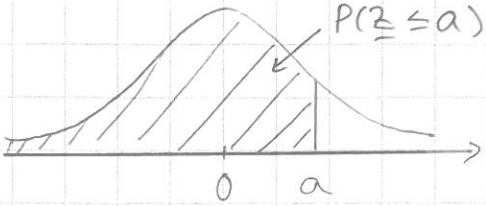
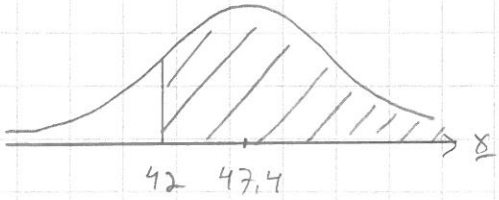
17. Normaalijakauman taulukko

$\underline{Z} \sim N(0,1)$



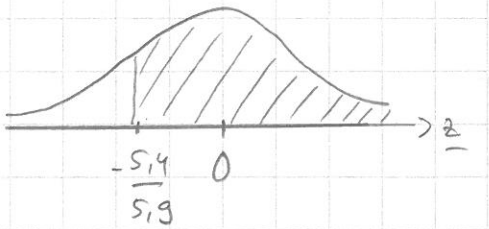
↑ kertymäfunktio, arvot taulukossa

17.3 $\underline{X}$: Suhan pituus, $\underline{X} \sim N(47{,}4;\ 5{,}9)$



$$P(\underline{X} > 42) = P\left(\underbrace{\frac{\underline{X}-47{,}4}{5{,}9}}_{\underline{Z} \sim N(0,1)} > \frac{42-47{,}4}{5{,}9}\right)$$

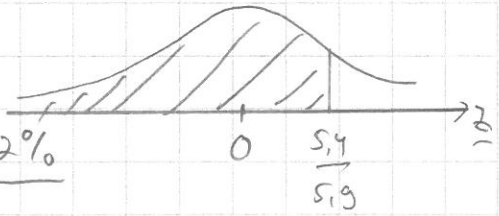
↑ normitus



$$= P\left(\underline{Z} > -\frac{5{,}4}{5{,}9}\right)$$

symmetria ⇓

$$= P\left(\underline{Z} < \underbrace{\frac{5{,}4}{5{,}9}}_{\approx 0{,}915254}\right)$$



$$= \Phi(0{,}915254) \approx 0{,}8212 \approx \underline{82\%}$$

17.5

10. Epäoleellinen integraali

Esim. $\int_1^t \frac{1}{x^3}\,dx = \int_1^t x^{-3}\,dx = \Big/_1^t \frac{1}{-2} \underbrace{x^{-2}}_{\frac{1}{x^2}} = -\frac{1}{2t^2} - \left(-\frac{1}{2\cdot 1^2}\right)$

$$= \frac{1}{2} - \frac{1}{2t^2} \xrightarrow{t\to\infty} \frac{1}{2} - 0 = \frac{1}{2} \overset{\text{merk.}}{=} \int_1^\infty \frac{1}{x^3}\,dx$$

$$\int_t^1 \underbrace{\frac{1}{\sqrt[3]{x}}}_{x^{-\frac{1}{3}}}\,dx = \int_t^1 x^{-\frac{1}{3}}\,dx = \Big/_t^1 \frac{1}{\frac{2}{3}} x^{\frac{2}{3}} = \frac{3}{2}\cdot 1^{\frac{2}{3}} - \frac{3}{2}\cdot t^{\frac{2}{3}}$$

$$= \frac{3}{2} - \frac{3}{2}\left(\sqrt[3]{t}\right)^2 \xrightarrow{t\to 0+} \frac{3}{2} - \frac{3}{2}\cdot 0 = \frac{3}{2} \overset{\text{merk.}}{=} \int_0^1 \frac{1}{\sqrt[3]{x}}\,dx$$

Yleisesti: $1^\circ \int_a^\infty f(x)\,dx = \lim_{t\to\infty} \int_a^t f(x)\,dx$

$2^\circ \int_a^b f(x)\,dx = \lim_{t\to b-} \int_a^t f(x)\,dx$, $f(b)$ ei ole määritelty

Epäoleellinen integraali *suppenee*, mikäli kyseinen raja-arvo on olemassa. Muutoin se *hajaantuu*.