

ü2

$$P(\underbrace{\mu - \sigma}_a \leq X < \underbrace{\mu + \sigma}_b)$$

Regel 4

$$= \Phi\left(\frac{\mu + \sigma - \mu}{\sigma}\right) - \Phi\left(\frac{\mu - \sigma - \mu}{\sigma}\right)$$

$$= \Phi(1) - \Phi(-1)$$

Tabelle 68.2%

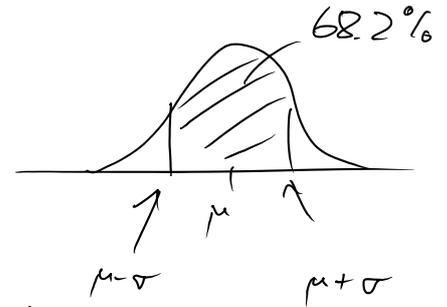
Analog:

$$P(\mu - 2\sigma \leq X < \mu + 2\sigma)$$

$$= \Phi(2) - \Phi(-2) = \underline{\underline{95.5\%}}$$

$$P(\mu - 3\sigma \leq X \leq \mu + 3\sigma)$$

$$= \Phi(3) - \Phi(-3) = \underline{\underline{99.7\%}}$$



Rezepte: Regel 4:

$$P(a \leq X < b) = \Phi\left(\frac{b - \mu}{\sigma}\right) - \Phi\left(\frac{a - \mu}{\sigma}\right)$$

ü4 Gefragt  $P(1.5 < X < 2.5)$  für  $X \sim N(2, 1^2)$

Lsg. nach Regel 4

$$P(1.5 < X < 2.5) = \Phi\left(\frac{2.5 - 2}{1}\right) - \Phi\left(\frac{1.5 - 2}{1}\right)$$

$$= \Phi(0.5) - \Phi(-0.5)$$

Nr. 1

$$= \Phi(0.5) - (1 - \Phi(0.5))$$

$$= 2\Phi(0.5) - 1$$

Tab

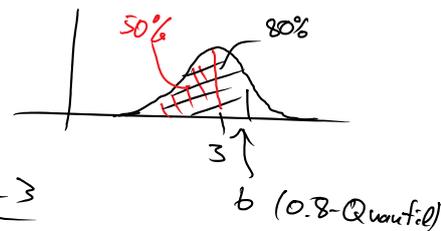
$$= 2 \cdot 0.6915 - 1 \approx 40\%$$

ü5 Wo liegt das 0.8-Quantil von  $X \sim N(3, 2^2)$ ?

$$P(X \leq b) = \Phi\left(\frac{b - 3}{2}\right) = 0.8 \Rightarrow$$

Tabelle rückwärts

$$z_{0.8} = 0.84 = \frac{b - 3}{2}$$



$$\Rightarrow b = 2 \cdot 0.84 + 3 = \underline{\underline{4.68}}$$

# ü Moivre-Laplace

Mittwoch, 4. Mai 2022 12:26

(Ü1) Y: Anzahl Mädchen

$$p=0.48 \rightarrow np=480 > 5$$

$$n(1-p)=520 > 5 \quad \checkmark$$

$$P(Y > 500) = 1 - P(Y \leq 500)$$

$$\approx \Phi\left(\frac{500 - 480 + 0.5}{\sqrt{520 \cdot 0.48}}\right) = \Phi(-1.2975)$$

$$= 1 - \Phi(1.2975)$$

Tab. bei  
1.30 ab  
lesen

$$\stackrel{\rightarrow}{=} \underline{\underline{9.72\%}}$$

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X: Anzahl Jungen

$$P(X < 500) = P(X \leq 499) = \Phi \dots = \underline{\underline{9.72\%}}$$

(Ü2)  $p=0.4 \Rightarrow np=400 > 5$ ,  $n(1-p)=600 > 5 \quad \checkmark$

$$P(X < 450) = P(X \leq 449) \approx \Phi\left(\frac{449 - 400 + 0.5}{\sqrt{600 \cdot 0.6}}\right) = \Phi(3.195)$$

$$\begin{array}{l} \text{graphcalc} \\ \text{Link} \end{array} \stackrel{\rightarrow}{=} \underline{\underline{99.93\%}}$$