

Aufgabe 7.1

$$\text{a) } P(Z \leq -0,5) \stackrel{(6.11)}{=} \Phi(-0,5) \stackrel{(7.44)}{=} 1 - \Phi(0,5) \stackrel{(A.1)}{=} 1 - 0,6915 = \mathbf{0,3085}$$

$$P(-1 \leq Z \leq 1) \stackrel{(7.46)}{=} \Psi(1) \stackrel{(A.2)}{=} \mathbf{0,6827}$$

$$P(-0,5 \leq Z \leq 1) \stackrel{(6.12)}{=} \Phi(1) - \Phi(-0,5) \stackrel{(A.1)}{=} 0,8413 - 0,3085 = \mathbf{0,5328}$$

$$P(|Z| \geq 1,75) = 1 - P(|Z| < 1,75) \stackrel{(7.46)}{=} 1 - \Psi(1,75) \stackrel{(A.2)}{=} 1 - 0,9199 = \mathbf{0,0801}$$

$$\text{b) } P(X \geq 6) = 1 - F_N(6 | 2; 25) \stackrel{(7.50)}{=} 1 - \Phi\left(\frac{6-2}{5}\right) = 1 - \Phi(0,8) \stackrel{(A.1)}{=} 1 - 0,7881 = \mathbf{0,2119}$$

$$P(0 \leq X \leq 10) = F_N(10 | 2; 25) - F_N(0 | 2; 25) \stackrel{(7.50)}{=} \Phi\left(\frac{10-2}{5}\right) - \Phi\left(\frac{0-2}{5}\right) = \Phi(1,6) - \Phi(-0,4) \stackrel{(A.1)}{=} 0,9452 - (1 - 0,6554) = \mathbf{0,6006}$$

$$P(|X-2| \leq 4) \stackrel{(7.51)}{=} \Psi\left(\frac{4}{5}\right) = \Psi(0,8) \stackrel{(A.2)}{=} \mathbf{0,5763}$$

$$P(|X| \geq 2) = 1 - P(|X| < 2) = 1 - P(-2 < X < 2) \stackrel{(7.50)}{=} 1 - \left[\Phi\left(\frac{2-2}{5}\right) - \Phi\left(\frac{-2-2}{5}\right) \right] = 1 - [\Phi(0) - \Phi(-0,8)] \stackrel{(A.1)}{=} 1 - [0,5 - (1 - 0,7881)] = \mathbf{0,7119}$$

Aufgabe 7.1 (Fortsetzung)

$$\begin{aligned} \text{c) } P(x \leq X \leq 0) &= 0,5328 \stackrel{(7.50)}{\Leftrightarrow} \Phi\left(\frac{0 - (-2)}{4}\right) - \Phi\left(\frac{x - (-2)}{4}\right) = 0,5328 \stackrel{(A.1)}{\Leftrightarrow} \Phi\left(\frac{x+2}{4}\right) = 0,6915 - 0,5328 = 0,1587 \\ &\stackrel{(7.44)}{\Leftrightarrow} \Phi\left(-\frac{x+2}{4}\right) = 1 - 0,1587 = 0,8413 \stackrel{(A.1)}{\Leftrightarrow} -\frac{x+2}{4} = 1 \Leftrightarrow x+2 = -4 \Leftrightarrow x = -6 \end{aligned}$$

$$P(|X+2| \leq \delta) = P(|X - (-2)| \leq \delta) = 0,3829 \stackrel{(7.51)}{\Leftrightarrow} \Psi\left(\frac{\delta}{4}\right) = 0,3829 \stackrel{(A.2)}{\Leftrightarrow} \frac{\delta}{4} = 0,5 \Leftrightarrow \delta = 2 \quad (\text{d.h. } P(-4 \leq X \leq 0) = 0,3829)$$