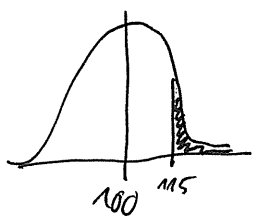
(6) a) $X \in N(100, 10)$

$$P(X > 115) = 1 - P(X \leq 115) = 1 - F_X(115)$$

$$= 1 - \Phi\left(\frac{115 - 100}{10}\right) = 1 - \Phi(1.5)$$

$$= 1 - 0.9332 = 0.0668 = 6.7\%$$

b)



(3)

(7) a) $p = 0.05$ $\quad X \in Bin(n, p)$

$n = 10$ $\quad X \in Bin(10, 0.05)$

b) $$p_X(k) = \binom{n}{k} p^k (1-p)^{n-k}$$

$$p_X(2) = \binom{10}{2} 0.05^2 \cdot 0.95^8 = \frac{10!}{2!\,8!} \cdot 0.05^2 \cdot 0.95^8$$

$$= \frac{10 \cdot 9}{2} \cdot 0.05^2 \cdot 0.95^8 = 0.0746 = 7.5\%$$

c) $$P(X \leq 3) = F_X(3) = 0.9989 = 99.9\%$$

d) $$P(X > 3) = 1 - P(X \leq 3) = 1 - 0.9989 = 0.1\%$$

(4)

(8)

a) $\bar{x} = 2.31 \qquad n_x = 5$

$s_x = 0.2246$

(2)

b) $\bar{y} = 2.51 \qquad n_y = 6$

$s_y = 0.21$

2-sample t-test, same variance (Student's)

$$t = \frac{\bar{x} - \bar{y}}{s_p \sqrt{\frac{1}{n_x} + \frac{1}{n_y}}} \in t(n_x + n_y - 2)$$

$$s_p^2 = \frac{(n_x - 1)s_x^2 + (n_y - 1)s_y^2}{(n_x - 1) + (n_y - 1)} = \frac{4 \cdot 0.2246^2 + 5 \cdot 0.21^2}{9} = 0.0469$$

$$\underline{s_p = 0.2166}$$

$$t = \frac{2.31 - 2.51}{0.2166 \cdot \sqrt{\frac{1}{5} + \frac{1}{6}}} = \underline{\underline{-1.525}} \qquad f = 9$$

$$\Omega = \{|t| > t_{\alpha/2}(f)\} = \{|t| > t_{0.025}(9)\} = \{|t| > 2.26\}$$

(3)

t_0 förkastas inte.

c) $\bar{z} = -0.2 \qquad n = 5$

$s_z = 0.05$

$$t = \frac{\bar{z}}{s_z/\sqrt{n}} \in t(n-1)$$

$$t = \frac{-0.2\sqrt{5}}{0.05} = \underline{\underline{-8.944}}$$

(3)

$$\Omega = \{|t| > t_{\alpha/2}(f)\} = \{|t| > t_{0.025}(4)\} = \{|t| > 2.78\}$$

t_0 förkastas