**26 januari 2004**

$Q = X + Y$

$(Q,Z)^T = \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} X \\ Y \end{pmatrix}$. De covariantiematrix voor $(Q,Z)^T$ is $\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \Sigma \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} = \begin{pmatrix} 1 & -1 \\ -1 & 5 \end{pmatrix}$

Opgave 1 $E(\bar{Z}_5) = E(Z) = E(X) - E(Y) = 1 + 1 = 2$

$Var(\bar{Z}_5) = \frac{1}{25}\sum_{i=1}^{5} Var(Z_i) = \frac{1}{25} 5Var(Z) = 1$

$Cov(Z,Q) = -1$

$E(S_z^2) = Var(Z) = 5$

$Var(\sqrt{2}S_z^2) = 2Var(S_z^2) = 2 \cdot 2(\sigma_z)^4/(4) = 25$ (opgave 9 H6, of hieronder)

$P(\bar{Z}_5 \leq S_z\frac{0.569}{\sqrt{5}} + 2) = P(\frac{\bar{Z}_5 - E(\bar{Z}_5)}{S_z/\sqrt{5}} \leq 0.569) = P(t_4 < 0.569) = 0.7$

De verdeling van $(Z,Q)$ is multivariaat normaal verdeeld met $\mu = (2,0)^T$ en $\Sigma = \begin{pmatrix} 1 & -1 \\ -1 & 5 \end{pmatrix}$

$Var(\frac{(n-1)S^2}{\sigma^2}) := Var(\chi^2_{n-1}) \Rightarrow \frac{(n-1)^2}{\sigma^4} Var(S^2) = 2(n-1) \Rightarrow Var(S^2) = \frac{2\sigma^4}{n-1}$.