

1. p261 5.1 gives a sample of size 4 from  $N_2(\mu, \Sigma)$ ,  $X = \begin{pmatrix} 2 & 8 & 6 & 8 \\ 12 & 9 & 9 & 10 \end{pmatrix}$ . Write a report on the test on

$H_0 : \mu = \begin{pmatrix} 7 \\ 11 \end{pmatrix}$  using rejection region at the level 0.05. Use SAS as your computation tool.

$H_0 : \mu = \mu_0$  versus  $H_a : \mu \neq \mu_0$  where  $\mu_0 = \begin{pmatrix} 7 \\ 11 \end{pmatrix}$

Test Statistic  $T^2 = (\bar{X} - \mu_0)' \left(\frac{S}{n}\right)^{-1} (\bar{X} - \mu_0)$

Reject  $H_0$  if  $T^2 > 57$  for  $\alpha = 0.05$

$T_{ob}^2 = (n-1) \left(\frac{1}{\Lambda_{ob}} - 1\right) = 3(0.18032784^{-1} - 1) = 13.636$

Fail to reject  $H_0$

2. Write the report on the test in 1 using p-value. State your conclusion at the level 0.05. Use SAS as your computation tool.

$H_0 : \mu = \mu_0$  versus  $H_a : \mu \neq \mu_0$  where  $\mu_0 = \begin{pmatrix} 7 \\ 11 \end{pmatrix}$

Test Statistic  $T^2 = (\bar{X} - \mu_0)' \left(\frac{S}{n}\right)^{-1} (\bar{X} - \mu_0)$

p-value:  $P(T^2(2, n-1) > T_{ob}^2)$

$T_{ob}^2 = (n-1) \left(\frac{1}{\Lambda_{ob}} - 1\right) = 3(0.18032784^{-1} - 1) = 13.636$

$P(T^2(2, 3) > 13.636) = P(F(2, 2) > 4.55) = 0.1803$

Fail to reject  $H_0$