1. **Bivariate Statistics**

a. μF = (56.8929 164.7143) & μM = (75.8977 178.0114)

b. μ is the mean of the vector Male/Female. Two components of the vector are Body Mass in Kg and Body Height in cm.

c.

cov(Female) =

47.0515	19.9421
19.9421	32.0257

cov(Male) =

141.3802	41.3000
41.3000	41.4826

d. cov(Female) =

47.0515 This is the variance of Weight of the Female Students	19.9421 This is the covariance Of Weight to the Height of Female students
19.9421 This is the covariance Of Weight to the Height of Female students	32.0257 This is the variance of Height of the Female Students

e. The calculation of Covariance shows that weight of the body increases with the increase in height.

2. **Pattern Recognition**

a.

Test Sample	Female Probabilities	Male Probabilities
$(60,169)^T$	0.0036	7.3004e-004
$(71,174)^T$	4.5724e-004	0.0020
$(70,173)^T$	6.5733e-004	0.0018

1. Sample $(60,169)^T$ is most likely a Female.
2. Sample $(71,174)^T$ is most likely a Male.
3. Sample $(70,173)^T$ is most likely a Male.

*under the condition of Equal Prior Probability and Equal Miscalculation Cost

b.

Test Sample	Female Probabilities * 0.8	Male Probabilities * 0.2
$(60,169)^T$	0.0029	1.4601e-004
$(71,174)^T$	3.6580e-004	4.0490e-004
$(70,173)^T$	5.2587e-004	3.6316e-004

1. Sample $(60,169)^T$ is most likely a Female.
2. Sample $(71,174)^T$ is most likely a Male.
3. Sample $(70,173)^T$ is most likely a Female.

*under the condition of Equal Miscalculation Cost

c.

Test Sample	Female Probabilities * 0.8 * 2.0	Male Probabilities * 0.2 * 0.5
$(60,169)^T$	0.0057	7.3004e-005
$(71,174)^T$	7.3159e-004	2.0245e-004
$(70,173)^T$	0.0011	1.8158e-004

1. Sample $(60,169)^T$ is most likely a Female.
2. Sample $(71,174)^T$ is most likely a Female.
3. Sample $(70,173)^T$ is most likely a Female.