Question 17 (14 marks)

Tina believes that approximately 60% of the mangoes she produces on her farm are large. She takes a random sample of 500 mangoes from a day's picking.

(a) Assuming Tina is correct and 60% of the mangoes her farm produces are large, what is the approximate probability distribution of the sample proportion of large mangoes in her sample? (3 marks)

(b) What is the probability that the sample proportion of large mangoes is less than 0.58? (2 marks)

(c) Tina decides to select the mangoes for her sample as they pass along the conveyor belt to be sorted. Describe briefly how Tina should select her sample. (2 marks)

A random sample of 500 contains 250 large mangoes.

(d)   On the basis of this data, estimate the proportion of large mangoes produced on the farm.

(1 mark)

(e)   Calculate a 95% confidence interval for the proportion of large mangoes produced on the farm, rounded to four decimal places. (3 marks)

(f)   On the basis of your calculations, how would you respond to Tina's belief that the proportion of large mangoes produced is at least 60%? Justify your response. (2 marks)

(g)   What can Tina do to further test her belief? (1 mark)