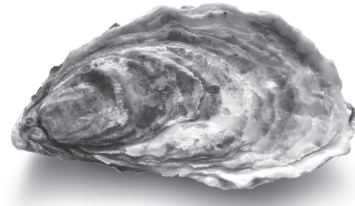


(15 marks)

The weight of individual oysters produced by the farm varies, and can be modelled by a normal distribution with a mean of $\mu = 82.3$ grams and a standard deviation of $\sigma = 5.3$ grams.



(a) Calculate the probability that a randomly selected oyster from this farm weighs between 80 grams and 90 grams.

(b) The farm categorises an oyster that weighs 85 grams or more as a luxury-sized oyster.

Find the value of k .

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When sold to European restaurants, a package of 12 oysters has a labelled net weight of 1 kilogram. (1 kilogram = 1000 grams.)

- (i) State the mean and standard deviation of S_{12} .

(ii) Determine the proportion of packages of 12 oysters that have a net weight of less than 1 kilogram.

(iii) Hence is it appropriate for this farm to sell its packages of 12 oysters that have a labelled net weight of 1 kilogram to European restaurants? Justify your answer.

Question 6 continues on page 16.

- (d) The mean weight of individual oysters produced by the farm was originally 82.3 grams.

The farm introduces a new farming method to produce oysters that have a greater individual weight. A sample of 100 oysters produced using this new farming method is randomly selected. The mean weight of the oysters in the sample is 89.1 grams.

- (i) Using the sample data, calculate a 95% confidence interval for the mean weight of oysters that are produced using the new farming method. Assume that the standard deviation remains at $\sigma = 5.3$ grams.

(2 marks)

- (ii) Does the confidence interval that you calculated suggest that the new farming method has increased the mean weight of oysters produced by this farm? Justify your answer.

(1 mark)

- (iii) After introducing the new farming method, the farm makes the following claim with 95% confidence:

'No more than 0.2% of our packages of 12 oysters will have a net weight that is less than 1 kilogram'.

Using your answer to part (d)(i), provide mathematical calculations to support the farm's claim.

(3 marks)