Central Limit Theorem + Unbiased Estimates

Jun 02

2 The standard deviation of a random variable F is 12.0. The mean of n independent observations of F is denoted by $\bar{F}$.

(i) Given that the standard deviation of $\bar{F}$ is 1.50, find the value of n. [3]

(ii) For this value of n, state, with justification, what can be said about the distribution of $\bar{F}$. [2]

Jun 04

2 The masses, X grams, of plums on a plum tree can be assumed to be normally distributed with mean μ grams and standard deviation σ grams.

(i) The mean mass in grams of 8 randomly chosen plums is denoted by $\bar{X}$. State the distribution of $\bar{X}$, giving parameters in terms of μ and σ. [1]

(ii) The masses of a random sample of 8 plums are summarised by

$$\Sigma x = 148.0, \qquad \Sigma x^2 = 2809.68.$$

Calculate unbiased estimates of μ and σ^2. [3]

June 03

1 The rainfall, x cm, is recorded at a weather station on each of 6 randomly chosen August days between 1990 and 1999. The data can be summarised by $\Sigma x = 6.3$, $\Sigma x^2 = 11.95$. Calculate unbiased estimates for the mean and variance of the daily rainfall in August at the weather station in this period. [4]