

Statistics 1

Mathematical Models in Probability and Statistics

- A mathematical model is a simplification of a real world situation
- Some advantages of mathematical models are:
 - They are quick and easy to produce
 - They can simplify a more complex situation
 - They can help us improve our understanding of the real world as certain variables can readily be changed
 - They can enable predictions to be made about the future
 - They can help provide control – as in air craft scheduling
- Some disadvantages are:
 - They only give a partial description of the real situation
 - They only work for a restricted range of values

Representation and Summary of Data – Location

- A variable that can take any value in a given range is a continuous variable
- A variable that can take only specific values in a given range is a discrete value
- A grouped frequency distribution consists of classes and their related class frequencies
 - Classes – 30-31 32-33 34-35
 - For the class 32-33
 - Lower class boundary is 31.5
 - Upper class boundary is 33.5
 - Class width is $33.5 - 31.5 = 2$
 - Class mid-point is $\frac{31.5 + 33.5}{2} = 32.5$
- The mode or modal class is the value that occurs the most
- The median is the middle value when the data is put in order
 - For discrete data you divide n by 2. When $\frac{n}{2}$ a whole number, find the corresponding term, if it's not a whole number round the number up and find the corresponding term.
 - For continuous grouped data divide n by 2 and use interpolation to find the value of the corresponding term.
 - Median $Q_2 = b + \frac{\frac{n}{2} - f}{f_c} \times c$ – *not in formula book*
 - b is the lower class boundary of the median class
 - n is the number of pieces of data
 - f is the sum of the frequencies below b
 - f_c is the frequency of the median class
 - c is the width of the median
- The mean is given by
 - $\bar{x} = \frac{\sum x}{n}$
 - $\bar{x} = \frac{\sum fx}{\sum f}$ – for grouped data
 - With $\sum x$ being the sum of all the x values