

Dr Oliver Mathematics
Mathematics
Statistical Models
Past Examination Questions

This booklet consists of 3 questions across a variety of examination topics.
The total number of marks available is 9.

1. (a) Write down two reasons for using statistical models. (2)

Solution

e.g., the mathematical model is used to make predictions about the expected behaviour of the real world problem,
experimental data is collected from the real world,
compare predicted and observed outcomes,
statistic tests are used to assess how well the model describes the real world,
the mathematical model is refined, if necessary, to improve the match of predicted outcomes with observed outcomes.

- (b) Give an example of a random variable that could be modelled by (2)
(i) a normal distribution,

Solution

e.g., height,
weight,
the amount of time to complete a task.

- (ii) a discrete uniform distribution.

Solution

e.g., score on a face after rolling a fair die.

2. (a) Give two reasons to justify the use of statistical models. (2)

Solution

e.g., used to simplify or represent a real world problem,
cheaper, quicker, or easier than the real situation,
more easily modified,
to improve understanding of the real world problem,
used to predict outcomes from a real world problem.

It has been suggested that there are 7 stages involved in creating a statistical model. They are summarised below, with stages 3, 4, and 7 missing.

Stage 1: The recognition of a real-world problem.

Stage 2: A statistical model is devised.

Stage 3:

Stage 4:

Stage 5: Comparisons are made against the devised model.

Stage 6: Statistical concepts are used to test how well the model describes the real-world problem.

Stage 7:

(b) Write down the missing stages.

(3)

Solution

Stage 3: experimental data is collected from the real world.

Stage 4: compare predicted and observed outcomes.

Stage 7: the mathematical model is refined, if necessary, to improve the match of predicted outcomes with observed outcomes.

3. Statistical models can provide a cheap and quick way to describe a real world situation. Give two other reasons why statistical models are used.

Solution

e.g., used to simplify or represent a real world problem,
more easily modified,
to improve understanding of the real world problem,
used to predict outcomes from a real world problem.