

QUEEN MARY, UNIVERSITY OF LONDON

MAS 108

Probability I

Key Objectives

Autumn 2005

To obtain a bare pass in the examination, you should be able to do all of the following.

- (a) Write down the sample space for simple experiments, including sampling with replacement (such as tossing coins or throwing dice), sampling without replacement, and trials with stopping rules.
- (b) Calculate probabilities in straightforward instances of the above three types of experiment.
- (c) Know the Kolmogorov axioms and make simple deductions from them.
- (d) Calculate the probability of the complement of an event; and of the union of two disjoint events.
- (e) State and use the inclusion-exclusion rule for two events.
- (f) Define and recognise independent events. Use independence to calculate probabilities.
- (g) Define conditional probability and calculate it.
- (h) Know the Theorem of Total Probability and use it in the case of a partition of the sample space into two events.
- (i) Understand the probability mass function of a discrete random variable.
- (j) Understand the cumulative distribution function and the probability density function of a continuous random variable, and be able to find each from the other.
- (k) Find the expected value and variance of discrete and continuous random variables.
- (l) Know two expressions for the variance of a random variable.
- (m) Use normal tables to find the probability that a standard or non-standard normal random variable is in a given interval, finite or infinite.
- (n) Know the main properties of Bernoulli, binomial, geometric, hypergeometric, Poisson, uniform, exponential and normal random variables.

The examination will contain SEVERAL short questions in Part A and FOUR long questions in Part B. The rubric will be as follows.

The paper has two Sections and you should attempt both Sections. Please read carefully the instructions given at the beginning of each Section.

Calculators are NOT permitted in this examination. The unauthorized use of a calculator constitutes an examination offence.

The New Cambridge Elementary Statistical Tables are provided.

The rubric to Section A will be as follows.

Section A: You should attempt all questions. Marks awarded are shown next to the question. This part of the examination carries 60% of the marks.

Section A will consist of several short questions, covering the whole course, in the style of the test.

The rubric to Section B will be as follows.

Section B: You may attempt as many questions as you wish and all questions carry equal marks. Except for the award of a bare pass, only the best TWO questions answered will be counted. This part of the examination carries 40% of the marks.

In part B you can expect to find

- questions like the longer coursework questions;
- linking questions, that relate material from more than one part of the course;
- bookwork (definitions, theorems, proofs) that is too long to be in a test;
- material covered too late to include in the test;
- stings in the tail.

R. A. Bailey
17 October 2005