

# QUEEN MARY, UNIVERSITY OF LONDON

**MAS 108**

**Probability I**

**Assignment 9**

**For handing in on 5 December 2005**

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*Write your name and student number at the top of your assignment before handing it in. Staple all the pages together. Post the assignment in the red post-box on the ground floor of the Maths building before 1600 on Monday.*

**This week's reading:** Devore, Chapter 4, Sections 4.1–4.3, part of Section 4.4, and Table A.3; *or* Hines and Montgomery, Chapter 7, Sections 7.1–7.3, and Chapter 4, Section 4.4, and Chapter 8, Sections 8.1–8.2, and Table II; *or* Rice, Chapter 2, Sections 2.2–2.3, and Table 2. *Also* New Cambridge Statistical Tables, Tables 4 and 5.

**1 (10 marks)** Find a uniform random variable which has expectation 5 and variance 3.

**2 (20 marks)** Passengers arrive at the bus-stop at the rate of one every 15 seconds, on average. Suppose that the time between arrivals is exponentially distributed. Find the probability that no one will arrive in the minute after you arrive at the bus-stop.

**3 (20 marks)** Let  $X$  and  $Y$  be random variables such that  $X \sim \text{uniform}[0, 9]$  and  $Y = \sqrt{X}$ .

- (a) What is the support of  $Y$ ?
- (b) Find the cumulative distribution function of  $Y$ .
- (c) Find the probability density function of  $Y$ .

**4 (15 marks)** Let  $Z$  be a standard normal random variable. Find

- (a)  $P(Z < 2.55)$
- (b)  $P(Z > 0.10)$
- (c)  $P(-2 \leq Z \leq 1)$ .

**5 (15 marks)** Let  $X \sim N(5, 16)$ . Find

(a)  $P(X < 6)$

(b)  $P(X > 0)$

(c)  $P(2 \leq X \leq 3)$ .

**6 (10 marks)** Let  $Z \sim N(0, 1)$ . Find  $x$  such that  $P(Z < x) = 0.975$ . Give the answer to three significant figures.

**7 (10 marks)** Let  $X \sim N(-10, 25)$ . Find  $x$  such that  $P(X < x) = 1/10$ . Give the answer to three significant figures.