

MT1652: EXAMPLE SHEET¹ X

- 1.) An experiment has five possible outcomes, the probabilities of which are given by the discrete probability distribution $p(i) = A/i$ for $i = 1, \dots, 5$. Determine A .
- 2.) The average rate of telephone calls received at a call centre with five operators is six per minute. If during any given one minute interval the number of callers exceeds the number of operators, the automated exchange puts callers on hold and makes them listen to a bad recording of a Vivaldi concerto before hanging up. What is the probability of being treated in this way when you call the call centre? [Hint: Use the Poisson distribution to determine the probability that the call centre receives more than five calls per minute].
- 3.) Without servicing, the four jet engines on a Boring 747 Dumbo Jet have a lifetime (in hours) which is a random variable with probability density function

$$f(t) = \begin{cases} A \sin(\pi t/100) & \text{for } 0 \leq t \leq 100 \\ 0 & \text{otherwise.} \end{cases}$$

- (i) Determine the value of A .
- (ii) A Boring 747 Dumbo Jet has just been fitted with newly serviced engines. Assuming that the lifetimes of its four jet engines are independent and that the plane is so heavily loaded that it can only operate if all engines are functioning, find the probability that the plane crashes within the first 10 hours from takeoff on its transatlantic flight.

This is the last example sheet. Good luck in the exam!

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