PROBABILITY PRACTICAL 2

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(1) Stroke patients with aphasic deficits are each given a number of straightforward tasks in a psychometric test. The number of errors made by 123 patients are shown in the table below. Calculate the expectation and variance of the number of errors per patient and comment on these values. Fit a Poisson distribution and comment on how well it fits the observed data.

Number of errors	0	1	2	3	4	5 or more
Number of patients	5	30	56	15	10	7

(2) Let X have uniform distribution on the interval $[a, b]$ defined as the continuous distribution whose density is constant on that interval and 0 outside it.
   (a) What are the density and the cdf of this distribution?
   (b) What are the expectation and variance?

(3) Suppose the mean household income in a city is £30,000, and the standard deviation is £10,000. 400 households are selected at random. Estimate the probability that the average household income in the sample is no more than £31,000. What do you think the distribution of incomes looks like? Does this matter for your answer?

(4) In a certain country the heights of adult males have mean 170cm and standard deviation 10cm, and the heights of adult females have mean 160cm and standard deviation 8cm; for each sex the distribution of heights approximates closely to a normal probability model. On the hypothesis that height is not a factor in selecting a mate, calculate the probability that
   (a) a husband and wife selected at random are both taller than 164cm
   (b) in a randomly selected husband and wife the wife is taller than the husband;
   (c) the average height of a random couple is greater than 168cm. [You may use the fact that the sum of two independent normal random variables is also normal.]

   If you know how to use `R` *you may use the* `pnorm` *command to calculate the normal cdf. Otherwise, you may use one of the many normal cdf calculators such as* `https://www.easycalculation.com/statistics/normal-distribution.php`.

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