MATU9D2: PRACTICAL STATISTICS

Spring 2017

PRACTICAL SESSION 2

- Hand Calculations II:
  Normal Distribution
  Binomial Distribution

- Handout 1 of 2

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ANSWER THE FOLLOWING QUESTIONS USING PEN, PAPER AND CALCULATOR - NOT COMPUTER

1. A normal distribution has a mean of 32 and a standard deviation of 4; find the Z values equivalent to the X values given below:

   (a) 35 (b) 27
   (c) 22.7 (d) 40.5
   (e) 30

2. Find the areas under the standard Normal distribution for the following:

   (a) to the right of Z = 1 (b) to the left of Z = 2
   (c) to the right of Z = -0.85 (d) between Z = 1.55 and Z = 2.15
   (e) between Z = -1 and Z = -1.96 (f) between Z = -2.33 and Z = 1.52

3. Invoices at a particular depot have amounts which follow a normal distribution with a mean of £104.60 and a standard deviation of £9.75.

   (a) What percentage of invoices will be over £121.15?
   (b) What percentage of invoices will be below £94.75?
   (c) What percentage of invoices will be between £86.75 and £119.60?
   (d) What will be the amount such that approximately 32% of invoices are for greater amounts?
   (e) Above what amount will 85% of invoices lie?

4. A factory employs 3000 workers, of whom 30% are women. If the 15 members of the union executive committee were chosen from the workers without regard to gender, the number of women on the committee would have a Bi(15, 0.3) distribution.

   (a) What is the probability that 3 or fewer members of the committee are women?

   (b) What is the probability that 10 or more members of the committee are men?

5. One way of checking the effect of under-coverage, non-response and other sources of error in a sample survey is to compare the sample with known demographic facts about the population. About 11% of adults earn more than £100,000, the number X of 'high earners' in a random sample of 1500 adults should vary with the Bi(1500, 0.11) distribution.

   (a) What are the mean and standard deviation of X?

   (b) Use the normal approximation to find the probability that the sample will contain 135 or fewer 'high earners'.