MDM 4UI Final Assessment Review

Probability Distributions

Key – *Identify if Binomial, Geometric, Hypergeometric or None of the Above*

1. A game is played where a die is rolled. If the number rolled is an even number n, then you win n^2 dollars. If the number rolled is an odd number n, you lose n^2 dollars. Calculate the amount you would expect to win or lose in the long run.

2. Livestock recover from a particular disease 40% of the time. A herd of 50 animals contract the disease. Find the probability that 45 of the animals recover. How many animals would you expect to recover?

3. A salesperson notes that he is able to make sales to 10 out of every 100 potential customers he speaks to. What is the probability of him talking to 7 customers before making his first sale on the eighth? How many customers would you expect him to talk to before making a sale?

4. A drawer contains five red socks and ten blue socks. If three socks are randomly selected, what is the probability of choosing exactly 2 red socks? How many red socks would you expect to get?

Normal Distributions

Key – *Identify if Discrete or Continuous*

1. For a particular production line in a widget factory it is known that the diameters of the widgets are normally distributed. The mean diameter is 10.35 cm and the standard deviation is 0.2 cm.
   (a) What is the probability of picking a widget with diameter less than 10 cm?
   (b) What is the probability of picking a widget with diameter greater than 10.5 cm?
   (c) Useful widgets must have a diameter between 10.25 cm and 10.65 cm. What is the probability of picking one in this range?

2. There are 35 defective computer chips for every 1000 made in a factory. If a batch contains 200 chips, using the normal approximation, what is the probability that less than 10 chips are defective?

3. A region has historically received an average of 5100 mm of rain annually with a standard deviation of 150 mm. However, over the last 10 years, the region has averaged 5300 mm of rain. Some scientists believe, that as a result of global warming, this region now receives more rain. Test this hypothesis with a significance level of 5%.

4. In a recent survey of Londoners, 85% thought that the 2004-05 Knights was the greatest CHL team of all time. If 200 people were surveyed, construct a 90% confidence interval for the proportion of Londoners who think the Knights were the greatest.

5. Suppose you are designing a poll on a subject for which you have no information on what people's opinions are likely to be. What sample size should you use to ensure a 90% confidence level that your results are accurate to $\pm 2\%$?