**Mathematics-Extension 1
Binomial distribution transcript** (Duration 3 minutes 16)

This is the HSC hub mathematics curriculum support from the New South Wales Department of Education. My name is Meagan Rodda. This question is from the NESA sample exam and incorporates material from the statistical analysis strand in the mathematics extension one course. This question looks at the binomial distribution.

We acknowledge that there may be different approaches, methods or techniques to answering this question, and we encourage you to discuss and share these ideas with each other. Please pause the video and take a moment to read the question and then we will look at the solution together.

In this question, we are being asked to find the mean and standard deviation for the distribution of sample proportions. The probability that adults eat out is 0.2 and the were 100 adults surveyed, so N is equal to 100. We know that for large sample sizes the sample distribution of P Hat is approximately normal, so this means that the mean of P hat will be equal to the population mean of 0.2 and the variance will be equal to P times 1 minus P divided by n. Substituting in our probability and sample size, we get a variance of 0.0016. To find the standard deviation, we simply take the square root of our variance, giving us the required value of 0.04.

In the second part of the question, we're looking for the probability that at most 15 of our 100 adults will eat out regularly. From the previous question, we know that the proportion mean is 0.2 and the standard deviation is 0.04. We want at most 15 out of 100 people to eat out regularly. So In other words, the proportion of people who eat out regularly needs to be less than 0.15. 0.15 equates to a z score of negative 1.25.

Looking at our table of z scores, we only have values for positive z scores. As a normal curve is symmetrical. Instead of finding the probability of z being less than negative 1.25 we can find the probability of z being greater than 1.25. Looking up a value of 1.25 in our table will give us the probability of zed being less than 1.25. As we want the probability of Z to be greater than 1.25, we need to subtract from one, leaving us with the probability of 0.1056.

This is the HSC hub for the New South Wales Department of Education.

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