

4.4 Binomial Distribution

Purpose: Generate some plots to see how the shape of the binomial distribution depends on the parameters n , the number of trials, and p , the probability of success.

Reading Assignment: Read through Section 4.4.

Step 1: Start Minitab from your Novell account. Plot the binomial probability distribution for $n=25$ and $p=0.5$, using the following Minitab commands.

```
MTB > name c1 'x' c2 'p(x)'  
MTB > set c1  
DATA> 0:25  
DATA> end  
MTB > pdf c1, put into c2;  
SUBC> binomial 25 0.5.  
MTB > plot c2 vs c1
```

STOP AND THINK: What does the distribution look like? Describe it!

Step 2: Mimicking Step 1, also plot the binomial distribution for $n=25$ and each of the following "success" probabilities: $p=0.4$, $p=0.3$, $p=0.2$ and $p=0.1$. (Thus, generate four more plots.) (An easy way to do this is to copy the last three Minitab lines (2 commands and 1 subcommand) used in Step 1, paste them at the last prompt in your Minitab Session window, edit the value of p , then press the "return" key.)

STOP AND THINK: What happens to the shape of the binomial distribution as the value of p moves away from a one-half and towards zero for 25 trials?

Step 3: Now, fix the value of p at $p=0.25$, and use Minitab to plot the four binomial distributions corresponding to $n=2, 10, 25$ and 40 . (To do so, again mimic step 1, but now copy the last six Minitab lines and change "0:25" to "0:n" and change "binomial 25 0.5." to "binomial n 0.25." based on the current value of n)

STOP AND THINK: What happens to the shape of the binomial distribution as the value of n increases for $p=0.25$?

Copy your Session window into a Word document, then paginate, save and print the document.

LAB REPORT: In your lab report, discuss how the shape of the binomial distribution changes as p gets further from 0.5 and closer to zero for fixed n . Also, discuss how the shape changes as n gets larger for fixed $p=0.25$. For each combination of n and p , determine the values three standard deviation above and below the mean, determine if these values are between zero and n , and see if this is related to the symmetry of the binomial distribution. (Append, annotate, and make reference to your output to support your comments.)

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