MATH 221 Statistics for Decision Making

Week 4 Lab

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Statistical Concepts:

* Probability
* Binomial Probability Distribution

# Calculating Binomial Probabilities

* Open a new Excel worksheet.

1. Open spreadsheet
2. In cell A1 type “success” as the label
3. Under that in column A, type 0 through 10 (these will be in rows 2 through 12)
4. In cell B1, type “one fourth”
5. In cell B2, type “=BINOM.DIST(A2,10,0.25,FALSE)” [NOTE: if you have Excel 2007, then the formula is BINOMDIST without the period]
6. Then copy and paste this formula in cells B3 through B12
7. In cell C1, type “one half”
8. In cell C2, type “=BINOM.DIST(A2,10,0.5,FALSE)”
9. Copy and paste this formula in cells C3 through C12
10. In cell D1 type “three fourths”
11. In cell D2, type “=BINOM.DIST(A2,10,0.75,FALSE)”
12. Copy and paste this formula in cells D3 through D12

Plotting the Binomial Probabilities

1. Create plots for the three binomial distributions above. You can create the scatter plots in Excel by selecting the data you want plotted, clicking on INSERT, CHARTS, SCATTER, then selecting the first chart shown which is dots with no connecting lines. Do this two more times and for graph 2 set Y equal to ‘one half’ and X to ‘success’, and for graph 3 set Y equal to ‘three fourths’ and X to ‘success’. Paste those three scatter plots in the grey area below.

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Calculating Descriptive Statistics

* You will use the same class survey results that were entered into the worksheet for the Week 2 Lab Assignment for question 2.

1. Calculate descriptive statistics for the variable (Coin) where each of the thirty-five students flipped a coin 10 times. Round your answers to three decimal places and type the mean and the standard deviation in the grey area below.

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| Mean:  Standard deviation: |

Short Answer Writing Assignment – Both the calculated binomial probabilities and the descriptive statistics from the class database will be used to answer the following questions. Round all numeric answers to three decimal places.

1. List the probability value for each possibility in the binomial experiment calculated at the beginning of this lab, which was calculated with the probability of a success being ½. (Complete sentence not necessary; round your answers to three decimal places)

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| --- | --- | --- | --- | --- |
| P(x=0) |  |  | P(x=6) |  |
| P(x=1) |  |  | P(x=7) |  |
| P(x=2) |  |  | P(x=8) |  |
| P(x=3) |  |  | P(x=9) |  |
| P(x=4) |  |  | P(x=10) |  |
| P(x=5) |  |  |  |  |

1. Give the probability for the following based on the calculations in question 3 above, with the probability of a success being ½. (Complete sentence not necessary; round your answers to three decimal places)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P(x≥1) |  |  | P(x<0) |  |
| P(x>1) |  |  | P(x≤4) |  |
| P(4<x ≤7) |  |  | P(x<4 or x≥7) |  |

1. Calculate (by hand) the mean and standard deviation for the binomial distribution with the probability of a success being ½ and n = 10. Either show work or explain how your answer was calculated. Use these formulas to do the hand calculations: Mean = *np*, Standard Deviation = 

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| Mean = *np*:  Standard Deviation = : |

1. Calculate (by hand) the mean and standard deviation for the binomial distribution with the probability of a success being ¼ and n = 10. Write a comparison of these statistics to those from question 5 in a short paragraph of several complete sentences. Use these formulas to do the hand calculations: Mean = *np*, Standard Deviation = 

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| --- |
| Mean = *np*:  Standard Deviation = :  Comparison: |

1. Calculate (by hand) the mean and standard deviation for the binomial distribution with the probability of a success being ¾ and n = 10. Write a comparison of these statistics to those from question 6 in a short paragraph of several complete sentences. Use these formulas to do the hand calculations: Mean = *np*, Standard Deviation = 

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| Mean = *np*:  Standard Deviation = :  Comparison: |

1. Using all four of the properties of a Binomial experiment (see page 201 in the textbook) explain in a short paragraph of several complete sentences why the Coin variable from the class survey represents a binomial distribution from a binomial experiment.

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1. Compare the mean and standard deviation for the Coin variable (question 2) with those of the mean and standard deviation for the binomial distribution that was calculated by hand in question 5. Explain how they are related in a short paragraph of several complete sentences.

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| Mean from question #2:  Standard deviation from question #2:  Mean from question #5:  Standard deviation from question #5:  Comparison and explanation: |