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## Chapter 4: Probability Distribution Functions

### Poisson Distribution

### Activity 1: Poisson-Distribution

ACME Realty reports it sells 75 homes in 25 days. What is the probability that exactly 2 homes will be sold tomorrow? *(Note: this is problem 8 from our Midterm review)*

### Activity 2: Poisson-Distribution

A Life Insurance (LI) salesman sells on average 3 LI policies per week. Assuming a Poisson Distribution, calculate the probability that in a given week she will sell:

(a) some policies

(b) 2 or more but less than 5 policies

(c) Assuming a five day workweek, what is the probability that in a given day, she will sell a policy?

### Activity 3: Poisson-Distribution

A company makes electrical motors. The probability an electrical motor is defective is 0.01. What is the probability that a sample of 415 electrical motors will contain exactly five defective motors?

### Activity 4: Visualizing-Poisson-Distribution

A 911 operator receives about six telephone calls between 8 a.m. and 10 a.m.

(a) What is the probability that she receives more than one call in the next 15 minutes?

(b) Plot the histogram for the probability $P(x) = P(X = x)$ for $x = 0, 1, 2, 3, \ldots$

| x | $P(x)$ |
|---|--------|
|   |        |
|   |        |
|   |        |
|   |        |
|   |        |
| ⋮ | ⋮ |

## Activity 5: Poisson-Distribution-Skewness

Look back at your histogram from Activity 4 part (b). Is the Poisson Distribution positively or negatively skewed?

## Activity 6: Frequency-Skewness

The following is a list of prices (in dollars) of birthday cards found in various drug stores:

```
1.45  2.20  0.75  1.23  1.25
1.25  3.09  1.99  2.00  0.78
1.32  2.25  3.15  3.85  0.52
0.99  1.38  1.75  1.22  1.75
```

(a) Organize this data with intervals of 50 cents (i.e. .50-0.99, 1.00-0.49, and so on) using create a frequency distribution table.

(b) Draw a Histogram of the data. State the skewness of the data.

# Chapter 3: Expectation

## Activity 7: Expectation

Suppose that a game is to be played with a single die assumed fair. In this game a player wins $20 if a 2 turns up, $40 if a 4 turns up; loses $30 if a 6 turns up; while the player neither wins nor loses if any other face turns up.

(a) State what the random variable $X$ is

(b) Find all the outcomes $x_1, \ldots, x_6$

(c) Find all the probabilities for each respective outcome

(d) Find the expected sum of money to be won (or lost).

(e) In a fair game, what do you think is a reasonable buy-in is in order to play the game?

## Activity 8: Expectation

A game is played where a player rolls a six sided die and if the result is an even number, they win 4 times the number in dollars, but if the result is odd, they lose 6 times the number in dollars. Find the expected winnings (or losings).

(a) Find the expected winnings (or losings).

(b) Even if the game is free, should you play?

## Confidence Intervals

### Activity 9: Confidence-Interval

Find a $C \cdot 100\%$ confidence interval for $\mu$ for the given values:

(a) $\bar{x} = 75$, $s = 13.2$, and $n = 57$

(b) $\bar{x} = 315$, $s = 63$, and $n = 100$

### Activity 10: Confidence-Interval

Below are the number of times per year 38 randomly selected employees for a large company feel overworked.

$$15, 23, 50, 31, 5, 27, 47, 43, 135, 164, 80, 123, 20, 34, 45, 56, 7, 12, 15,$$
$$16, 18, 64, 79, 84, 19, 32, 34, 56, 200, 0, 16, 61, 31, 52, 61, 70, 365, 105$$

(a) Find a 85% confidence interval for $\mu$ for the population mean of this data.

(b) Find a 90% confidence interval for the population mean of this data.