MATH 460: Probability & Statistics — September 2018

Chapter 5: Sampling Theory & Chapter 2: Probability Distribution Functions

In-Class Activity #3 — Dr. Basilio

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Chapter 4: Probability Distribution Functions

Visualizing a Binomial Distribution

Activity 1: Visualizing-Binomial-Distribution

Let X be the number of heads that turn up after flipping a coin five times. Then $n = 5$ and x can be $0, 1, 2, 3, 4, 5$. We can calculate the probability of zero heads turning up with $P(X = 0)$, one head turning up with $P(X = 1)$, etc. Using our calculator check that:

$$P(X = 0) = \frac{1}{32}, P(X = 1) = \frac{5}{32}, P(X = 2) = \frac{10}{32}, P(X = 3) = \frac{10}{32}, P(X = 4) = \frac{5}{32}, P(X = 5) = \frac{1}{32}$$

(a) Plot a histogram for the random variable X probability distribution.

To do this, on the horizontal axis scale from $x = 0, 1, 2, 3, 4, 5$ and the vertical axis scale from 0 to $10/32$ with $1/32$ intervals.

(b) Describe any interesting features from your histogram.

(c) Sketch what you think the histogram would look like for the same random variable X but the number of trails is $n = 100$.

Activity 2: Visualizing-Binomial-Distribution

Let our experiment be shooting free-throws. Assume that the probability of making a freethrow is 70% and that these are independent events. Let X be the number of made in taking six shots.

(a) Use your calculator to find $P(X = x)$ for $x = 0, 1, 2, 3, 4, 5, 6$.

(b) Plot a histogram for the random variable X probability distribution.

(c) Describe any interesting features from your histogram.

Normal Distribution

Activity 3: Normal-Distribution

Weight (in grams) of bags of sugar from a factory are normally distributed, with a mean of 1000g, and standard deviation of 13g. Find the following.

(a) The probability that a randomly selected bad of sugar weighs in between 974g and 1000g.

(b) The percentage of bags whose weight is above 1026g.

Activity 4: Normal-Distribution

The time it takes employees to get to work from home (in minutes) is normally distributed with a mean of 30 minutes, and a standard deviation of 5 minutes. Find the following.

(a) The percentage of employees that take between 20 and 40 minutes to get to work. Do this without a calculator.

(b) The percentage of employees that take between 28 and 37 minutes to get to work. Do this with a calculator.

Standard Normal Distribution

Activity 5: Conver-Z-values

Convert each of the following between x and z values.

(a) $x = 35$ where $\mu = 40, \sigma = 2$

(b) $x = 130$ where $\mu = 100, \sigma = 12$

(c) $z = -0.57$ where $\mu = 14, \sigma = 1.5$

Activity 6: Standard-Normal-Distribution

Find the area under the standard normal curve between

(a) $Z = 0$ and $Z = 1.2$

(b) $Z = -0.68$ and $Z = 0$

(c) $Z = -0.46$ and $Z = 2.21$

(d) to the right of $Z = -1.28$

Activity 7: Standard-Normal-Distribution

The mean weight of 500 male students at a certain college is 151 lb and the standard deviation is 15 lb. Assuming that the weights are normally distributed, find without using a calculator how many students weigh

(a) between 120 and 155 lb

(b) more than 185 lb.

Activity 8: 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.