

NAME(S) \_\_\_\_\_

*Virtual Lab Activity: The Normal Approximation to the Binomial*

[The Virtual Laboratory for Probability and Statistics was developed by Dr. Kyle Siegrist at UAH.]

Go to [www.math.uah.edu/stat/](http://www.math.uah.edu/stat/)

Select

11. Bernoulli Trials
2. The Binomial Distribution

Scroll down to the lesson on The Normal Approximation, and turn in:

37. Set the random variable to  $M$  = the proportion of successes. Set  $p = .1$ . Start with  $n = 1$  and progress to  $n = 100$ . Repeat for the other values of  $p$  (.3, .5, .7, .9) and observe the changes in the shape of the distribution. Specifically, what change did you observe in the distribution standard deviation of each distribution as  $n$  increased?

For  $n = 100$ , and 1000 runs

	Dist. mean	Data mean	Dist SD	Data SD
P=.1				
P=.3				
P=.5				
P=.7				
P=.9				

40. Set the random variable to  $X$ . With  $n = 15$ ,  $p = .15$ , and 1000 runs, record
- a) The actual probability that  $P(5 \leq X \leq 10)$ . Use the Distribution values.
  - b) The relative frequency probability that  $P(5 \leq X \leq 10)$ . Use the Data values of the simulation.
  - c) The Normal approximation to  $P(5 \leq X \leq 10)$ . Calculate by hand letting  $\mu$  = the mean of the binomial distribution and  $\sigma$  = the standard deviation of the binomial distribution.

45 & 46. Experiment with the Galton Board and note the binomial distribution patterns.