Warm-Up 10

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1 Formula Area

- Expectation value of a discrete random variable X: $E[X] = \sum_i p_i x_i$, where p_i is the probability of X taking a value x_i. For a population, we refer to the expectation value or μ.
- $E[X] = np$, where X is a binomially-distributed discrete random variable, the number of successes x in n trials.
- Variance of a discrete random variable X: $Var[X] = \sum_i (x_i - \mu)^2 p(x_i)$
- $Var(X) = npq$, where X is a binomially-distributed discrete random variable. The standard deviation is $\sigma = \sqrt{npq}$.

2 Concepts from Chapter 4

1. Suppose a psychologist is studying whether or not babies have the concept of morality. Specifically, she wants to know if babies choose a puppet shown to behave "badly," or one that behaves "well." The babies can choose either bad puppet, or good puppet, and there is a run of 100 babies. (a) What would you expect for the results N_{good} and N_{bad} if the babies were choosing randomly? (b) For our discrete random variable N_{good}, the number of babies in a run that chose the good puppet, what is p for random selection? (c) Consider Tab. 1 below. Determine the expectation value for the number of babies in a given run that choose good puppet. The data is based on 10 runs of 10 babies each. (d) Is this data binomially distributed? Why or why not?

x	N_{good}	$p(x)$	$x * p(x)$
0	0		
1	0		
2	0		
3	1		
4	0		
5	1		
6	2		
7	5		
8	1		
9	0		
10	0		

Table 1: A table displaying a stock trader's assessment of the odds that TelCo stock will earn her a profit or a loss.