Math 153 - Quiz 7
March 28, 2019

Name key
Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (6 points) For each situation, determine whether the random variable x is in a binomial distribution. If not, explain why.

   (a) A bowl contains 50 M & M candies, ten of which are blue. Eight candies are selected and eaten, one at a time. Let x be the number of blue candies selected.

   WITHOUT REPLACEMENT
   $\frac{8}{50} = 16\% > 5\%$ TRIALS ARE NOT INDEP., NOT BINOMIAL

   (b) There are 23 female U.S. senators, and 17 of them are Democrats. Five female senators are randomly selected with replacement. Let x be the number of Democrats selected.

   BINOMIAL

   (c) Looking at U.S. health records, 291 single births are selected at random. Let x be the mean weight.

   X IS A CONTINUOUS RANDOM VARIABLE $\Rightarrow$ NOT BINOMIAL

   (d) A die is rolled four times. Let x be the sum of the numbers rolled.

   MORE THAN 2 OUTCOMES PER TRIAL $\Rightarrow$ NOT BINOMIAL

2. (4 points) Based on a recent Gallup poll, 47% of Americans believe nuclear power plants are safe. Ten Americans are randomly selected. Let x be the number of Americans in the sample who believe nuclear power plants are safe.

   (a) What are the possible values of x?

   0, 1, 2, 3, ..., 9, 10

   (b) The problem makes it sound like the ten people are selected without replacement. Does this mean the trials are not independent? Explain.

   5% RULE! TECHNICALLY YES, BUT 10 AMERICANS IS FAR LESS THAN 5% OF THE U.S. POPULATION

   (c) What is the probability that 5 people in the sample believe that nuclear power plants are safe?

   $P(x=5) = \text{binompdf}(10, 0.47, 5)$

   ≈ 0.2417