Math 153 - Quiz 8

November 3, 2016

Name key

Score _____

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

BINOMIAL
$n = 55$
$p = 0.464$
$q = 0.536$

1. (5.5 points) 46.4% of Americans have full-time jobs. A sample of 55 Americans are selected at random.

   (a) What is the probability that exactly 26 of them have full-time jobs?

   $$P(x=26) = \text{binompdf}(55, 0.464, 26) \approx 0.1064$$

   (b) What is the probability that fewer than 30 have full-time jobs?

   $$P(x<30) = P(x \le 29) = \text{binomcdf}(55, 0.464, 29) \approx 0.8590$$

   (c) In the sample of 55, what would be an unusually small number of full-time workers?

   $$\mu - 2\sigma = np - 2\sqrt{npq} \approx 18.123$$

   18 OR FEWER

   (d) Even though the sample is selected without replacement, you probably assumed the selections were independent of one another. How can you do this?

   THE SAMPLE SIZE OF 55 IS FAR LESS THAN THE POPULATION OF AMERICANS. THE "WITH REPLACEMENT" APPROXIMATION IS JUSTIFIED.

2. (4.5 points) During daytime hours, a certain customer service call center receives an average of 31.6 calls per hour.

POISSON
$\mu = 31.6$

   (a) In any given daytime hour, what is the probability that the center receives 31 calls?

   $$P(x=31) = \text{Poissonpdf}(31.6, 31) \approx 0.0711$$

   (b) In any given daytime hour, what is the probability that the center receives more than 35 calls?

   $$P(x>35) = 1 - P(x \le 35) = 1 - \text{poissoncdf}(31.6, 35) \approx 0.2391$$

   (c) Would it be unusual for the call center to receive 42 calls in an hour? Explain.

   $$\mu + 2\sqrt{\mu} \approx 42.8 \Rightarrow 42 \text{ IS NOT UNUSUAL.}$$