

Math 153 - Quiz 7

October 23, 2014

Name key

Score _____

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

1. (4 points) Illinois experiences about 37.6 tornadoes per year.

(a) In any given year, what is the probability of there being 30 or fewer tornadoes?

Poisson
 $\mu = 37.6$

$$P(k \leq 30) = \text{poissoncdf}(37.6, 30) \\ \approx 0.1211 \approx \boxed{12.11\%}$$

(b) What is the probability of there being more than 45 tornadoes?

$$P(k > 45) = 1 - P(k \leq 45) \\ = 1 - \text{poissoncdf}(37.6, 45) \approx 0.1015 \\ \approx \boxed{10.15\%}$$

2. (6 points) In a certain region, polls indicate that Democrats have a 62% chance of winning elections. Fifteen races are selected at random in that region.

(a) What is the probability that exactly 10 Democrats win elections?

BINOMIAL
 $N = 15$
 $p = 0.62$
 $q = 0.38$

$$P(k = 10) = \text{binomialpdf}(15, 0.62, 10) \\ \approx 0.1997 \approx \boxed{19.97\%}$$

(b) What is the probability that 8 or more Democrats win elections?

$$P(k \geq 8) = 1 - P(k \leq 7) \\ = 1 - \text{binomialcdf}(15, 0.62, 7) \approx 0.8313 \approx \boxed{83.13\%}$$

(c) What would be an unusually small number of winning Democrats?

$$\mu = np = 15(0.62) = 9.3$$

$$\sigma = \sqrt{npq} = \sqrt{15(0.62)(0.38)} \approx 1.88$$

$$9.3 - 2(1.88) = 5.54$$

5 OR FEWER WOULD
BE UNUSUAL