

Math 153 - Quiz 8

November 1, 2012

Name key

Score _____

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

1. (6 points) In a certain town, 63% of the children dress as vampires on Halloween.

(a) In a sample of 10 randomly selected children, what is the probability that at least 7 are dressed as vampires?

$$\begin{aligned} \text{BINOMIAL: } P(X \geq 7) &= 1 - P(X \leq 6) \\ p &= 0.63 \\ q &= 0.37 \\ &= 1 - \text{binomialcdf}(10, 0.63, 6) = \boxed{0.46} \end{aligned}$$

(b) How many vampires would you expect in a sample of 10?

$$\mu = 10(0.63) = \boxed{6.3}$$

(c) In a sample of 10, what would be an unusually small number of vampires? Show work to justify your reasoning.

$$\begin{aligned} \sigma &= \sqrt{10(0.63)(0.37)} \\ &\approx 1.527 \end{aligned}$$

$$\mu - 2\sigma = 3.246$$

3 OR FEWER WOULD BE UNUSUALLY SMALL.

2. (4 points) In the United States from 1850 to 2000, there were an average of 17.93 hurricanes per decade.

(a) In any given decade, what is the probability that 12 or fewer hurricanes affect the United States?

$$\begin{aligned} \text{POISSON: } P(X \leq 12) &= \text{poissoncdf}(17.93, 12) \\ \mu &= 17.93 \\ &= \boxed{0.0943} \end{aligned}$$

(b) In the 1880s, the US was hit by 27 hurricanes. Is this an unusually large number of hurricanes in a decade? Show work to justify your reasoning.

$$\begin{aligned} \mu &= 17.93 \\ \sigma &= \sqrt{\mu} \approx 4.23 \end{aligned}$$

$$27 > 26.4$$

$$\mu + 2\sigma \approx 26.4$$

⇒ YES, 27 IS UNUSUALLY LARGE!