Math 153 - Quiz 8

March 29, 2018

Name key

Score _____

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

1. (5.5 points) Throughout the world, there are about 450 earthquakes per month that measure more than 4.5 on the moment magnitude scale.

   (a) What is the average number of these earthquakes per week?

   Poisson
   $\lambda = \mu = 112.5$

   $\mu = \frac{450}{4} = 112.5$

   (b) In any given week, what is the probability that there are exactly 120 of these earthquakes?

   $P(x = 120) = \text{poissonpdf}(112.5, 120) \approx 0.0285$

   (c) In any given week, what is the probability that there are at least 115 of these earthquakes?

   $P(x \geq 115) = 1 - P(x \leq 114) = 1 - \text{poissoncdf}(112.5, 114) \approx 0.4193$

   (d) What is an unusually large weekly number of these earthquakes?

   $112.5 + 2\sqrt{112.5} \approx 133.7 \Rightarrow$ 134 or more

2. (4.5 points) According to a recent Gallup poll, 78% of Americans prefer drug-free pain management over doctor-prescribed pain medication. A random sample of 35 Americans is obtained.

   Binomial
   $n = 35$
   $p = 0.78$
   $q = 0.22$

   (a) What is the probability that fewer than 20 prefer drug-free pain management?

   $P(x < 20) = P(x \leq 19) = \text{binomcdf}(35, 0.78, 19) \approx 0.00156$

   (b) What is the probability that 25 prefer drug-free pain management?

   $P(x = 25) = \text{binompdf}(35, 0.78, 25) \approx 0.0978$

   (c) In the sample of 35, what would be an unusually small number of people who prefer drug-free pain management?

   $\mu - 2\sigma = np - 2\sqrt{npq} = 35(0.78) - 2\sqrt{35(0.78)(0.22)}$

   ≈ 22.4

   22 or fewer