Math 153 - Quiz 8

April 4, 2017

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary. YOU MUST WORK INDIVIDUALLY.

1. (3 points) The quality assurance department at an aluminum foil manufacturer has determined that the foil products have an average of 3 flaws per square meter of foil.

   (a) In a randomly chosen square meter of foil, what is the probability that there are at least 4 flaws?

   Poisson $\mu = 3$

   $$P(x \geq 4) = 1 - P(x \leq 3) = 1 - \text{poissoncdf}(3,3)$$
   $$\approx 0.3528 = 35.28\%$$

   (b) What is an unusually large number of flaws in a one-square-meter sample?

   $$\mu + 2\sqrt{\mu} = 3 + 2\sqrt{3} \approx 6.5$$

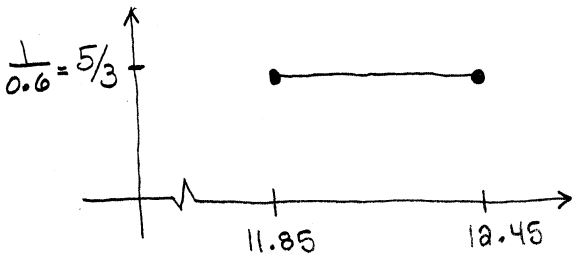
   7 OR MORE ARE UNUSUAL

2. (4 points) The foot-long sub sandwiches at Sub Station have lengths that are uniformly distributed between 11.85 in and 12.45 in.

   (a) Sketch the graph of the probability density function.

   $12.45 - 11.85 = 0.6$

   $\frac{1}{0.6} = \frac{5}{3}$

   (b) What is the probability that a randomly chosen sub sandwich is between 12.00 in and 12.10 in long?

   $$P(12 \leq x \leq 12.10) = (12.10 - 12)\left(\frac{1}{0.6}\right) = \frac{0.10}{0.6} = \frac{1}{6}$$

   (c) What is the probability that a randomly chosen sub sandwich is exactly 12 in long?

   $$P(x = 12) = 0$$

3. (3 points) A soda manufacturer has determined that its filling line fills 12 oz cans in such a way that the volumes are normally distributed with mean 12.05 oz and standard deviation 0.02 oz.

(a) What is the probability that a randomly selected can will have volume of 12 oz or less?

$$P(X \leq 12) = \text{normalcdf}(-999999, 12, 12.05, 0.02)$$

$$\approx 0.0062 = 0.62\%$$

(b) In a sample of 500 cans of soda, about how many will have volumes between 12.05 oz and 12.06 oz?

$$500 \times P(12.05 \leq X \leq 12.06)$$

$$= 500 \times \text{normalcdf}(12.05, 12.06, 12.05, 0.02)$$

$$\approx 95.73$$

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