

Math 153 - Quiz 8

April 4, 2019

Name key

Score _____

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

1. (5 points) Spam email messages originate from all over the world. Heather has determined that, on average, she receives 57.6 spam email messages per day.

- (a) On any given day, what is the probability that Heather receives 60 spam email messages?

$$P(x=60) = \text{poissonpdf}(57.6, 60) \approx 0.04896 \approx \boxed{4.90\%}$$

- (b) On any given day, what is the probability that Heather receives more than 60 spam email messages?

$$P(x > 60) = 1 - P(x \leq 60) = 1 - \text{poissocdf}(57.6, 60) \approx 0.3443 = \boxed{34.43\%}$$

- (c) Yesterday Heather received 42 spam email messages. Is that an unusual number of spam messages?

$$\mu - 2\sigma = 57.6 - 2\sqrt{57.6} \approx 42.42 \quad \text{Yes! } 42 \text{ is UNUSUAL.}$$

2. (5 points) Lots of evidence suggests that there is a significant gap between the wages made by U.S. men and women (for comparable work). Disturbingly, a recent survey revealed that 46% of American men believe that the wage gap is a made up thing designed to serve political purposes. Twenty American men are selected at random.

- (a) What is the probability that 8 or fewer believe the wage gap is made up?

$$P(x \leq 8) = \text{binomcdf}(20, 0.46, 8) \approx 0.3793 = \boxed{37.93\%}$$

- (b) What is the probability that at least 12 believe the wage gap is made up?

$$P(x \geq 12) = 1 - P(x \leq 11) = 1 - \text{binomcdf}(20, 0.46, 11) \approx 0.1511 = \boxed{15.11\%}$$

- (c) In the sample of 20, what would be an unusually large number of men who believe the gap is made up?

$$\begin{aligned} \mu + 2\sigma &= np + 2\sqrt{npq} \\ &= 20(0.46) + 2\sqrt{20(0.46)(0.54)} \\ &\approx 13.66 \end{aligned}$$

14 or more is an unusually large number.

Poisson
 $\mu = 57.6$

Binomial
 $n = 20$
 $p = 0.46$
 $q = 0.54$