

Quiz 3 review

Stat 301

Summer 2019

- (1) Find the probability of the following z-scores:
 - (a) $P(Z < 1.89)$
 - (b) $P(Z > -0.5)$
 - (c) Find z such that $P(Z \geq z) = 0.09$ (find the z-score that represents the top 9%)
 - (d) $P(-1 < Z < 0.87)$
- (2) Given that $X \sim N(33, 3.15)$, find the following probabilities:
 - (a) $P(X > 41)$
 - (b) $P(X < 27)$
 - (c) $P(25 < X < 40)$
 - (d) Find x such that $P(X \leq x) = 0.25$ (find the value of X that represents the bottom 25% of the distribution)
- (3) The reaction time (in seconds) to a certain stimulus is a continuous random variable with pdf:

$$f(x) = \begin{cases} \frac{3}{2x^2} & 1 \leq x \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

- (a) Find $F_X(x)$ (cumulative density function)
 - (b) What is the probability that reaction time is at most 2.5 seconds?
 - (c) What is the probability that reaction time is between 1.5 and 2.5 seconds?
 - (d) Compute the expected reaction time
 - (e) Compute the variance and standard deviation
- (4) A subway train on the Red Line arrives every eight minutes during rush hour uniformly. Of interest is the length of time a commuter must wait for a train to arrive during rush hour.
 - (a) State the distribution and its parameter(s)
 - (b) Find $F_X(x)$ (cumulative density function)
 - (c) Find the probability that the commuter waits less than one minute
 - (d) Find the probability that the commuter waits between three and four minutes
 - (e) Find the probability that the commuter waits more than 5 minutes
 - (f) Compute the expected waiting time
 - (g) Compute the variance and standard deviation
- (5) During the years 2003-2018, a total of 31 earthquakes of magnitude greater than 6.5 have occurred in Papua New Guinea. Assume that the time spent waiting between earthquakes is exponential.
 - (a) What is the decay rate λ ? State the distribution with shorthand notation.
 - (b) What is the probability that the next earthquake occurs within the next three months?
 - (c) Given that six months has passed without an earthquake in Papua New Guinea, what is the probability that the next three months will be free of earthquakes?
 - (d) Calculate EX , VX , SDX