

1 Know your Test 1 and 2 materials

2 Binomial Distribution

1. Roll a fair die 20 times. Let X be the random variable that is the count of successes, where a success is a roll of a five or a six.
 - (a) What is the probability of $X = 3$?
 - (b) What is the probability of $X > 3$?
 - (c) What is mean of X ?
 - (d) What is variance of X ?

3 Normal Distribution

2. Assume we have the following two tests
 - SAT with $\mu = 900$ and $\sigma = 100$
 - ACT with $\mu = 21$ and $\sigma = 5$
 - (a) What is the Z-score of an SAT score of 1020? What is the Z-score of an ACT score of 27? Which scores in a higher percentile?
 - (b) What is the Z-score that relates to a 95%? that is find the $Z_{0.95}$ where $Pr(Z \leq Z_{0.95}) = 0.95$.
 - (c) What is the SAT score for the 95th percentile? What is the ACT score for the 95th percentile?

4 Central Limit Theorem

3. Assume we roll fair a die 1000 times. We consider a success a roll of a five or a six. Let X be the random variable for the count of the number of successes.
 - (a) What is the mean and standard deviation for X ?
 - (b) Find the probability that we get more than 350 successes (use the CLT)?
 - (c) Find the Z score for the 90 percentile.
 - (d) Find $X_{0.90}$ where $Pr(X \leq X_{0.90}) = 0.90$.

5 One More Order Statistic

4. Let X be a continuous RV with pdf $f(x) = \frac{1}{7}e^{-x/7}$ for $x > 0$.
- (a) Compute $E(X)$.
 - (b) Compute $VAR(X)$.
 - (c) Compute the $Pr(X < 6)$.
5. Assume the lifespan of a light bulb in this classroom has the pdf of $f(x) = \frac{1}{7}e^{-x/7}$ for $x > 0$.
- (a) The building is 6 years old (so the lightbulbs are six years old). Find the probability that a light bulb is working after 6 years.
 - (b) Out of 20 lightbulbs in this room, what is the probability that the third one to die died before year six?