MATH 10B
Section 205
GSI: Theo McKenzie

Quiz 8

Student:
SID:
Tue 3/19/19

True/False - No explanation needed. (For each: 1 point if correct, 0 points if not answered, -1 points if incorrect)

1. Call normalized distribution $Z = \frac{\overline{X}-\overline{\mu}}{\overline{\sigma}\sqrt{n}}$, where $\overline{X}$ is a the average of n independent copies of a random variable X. $\overline{X}$ has expectation $\overline{\mu}$ and standard error $\overline{\sigma}$. As $n \to \infty$, $\text{Var}(Z) \to 0$. True/False

   False. As $n \to \infty, \overline{\sigma} = 1$ consistently.

2. The two types of geometric distributions: calculating the number of failures versus counting the number of trials, have different expectations but the same variance. True/False

   True. The expectations are $1/p$ vs $(1-p)/p$, but the variance is the same as shifting a random variable by a constant does not change the variance.

Problems - Needs justification.

1. Ozias shoots two basketball shots. Each has a .6 chance of scoring, and the shots are independent. Call X_1 the random variable representing if the first shot was made, and X_2 the random variable for the second shot. If $Y = X_1 + X_2$ and $Z = 3X_1$, compute $\text{Cov}(Y, Z)$. (10 points)

$$\begin{aligned} \text{Cov}(Y, Z) &= \\ &= \text{Cov}(X_1 + X_2, 3X_1) \\ &= \text{Cov}(X_1, 3X_1) + \text{Cov}(X_2, 3X_1) \\ &= 3\text{Cov}(X_1, X_1) + 3\text{Cov}(X_2, X_1) \\ 3\text{Var}(X_1) & \\ 3(.6 - .6^2) & \end{aligned}$$