STAT/MA 41600
In-Class Problem Set #36: November 7, 2018
Solutions by Mark Daniel Ward

Problem Set 36 Answers

1. We let $X_1, \ldots, X_{24}$ denote the weights (in oz.) of the candies. We have $P(X_1 + \cdots + X_{24} > 20) = P\Big(\frac{X_1 + \cdots + X_{24} - (24)(0.8)}{\sqrt{(24)(0.12)^2}} > \frac{20 - (24)(0.8)}{\sqrt{(24)(0.12)^2}}\Big) = P(Z > 1.36) = 1 - P(Z \leq 1.36) = 1 - 0.9131 = 0.0869.$

2. We have $P(|X_1 - X_2| < 0.1) = P(-0.1 < X_1 - X_2 < 0.1) = P\Big(\frac{-0.1 - (0.8 - 0.8)}{\sqrt{0.12^2 + 0.12^2}} < \frac{X_1 - X_2 - (0.8 - 0.8)}{\sqrt{0.12^2 + 0.12^2}} < \frac{0.1 - (0.8 - 0.8)}{\sqrt{0.12^2 + 0.12^2}}\Big) = P(-0.59 < Z < 0.59) = P(Z < 0.59) - P(Z \leq -0.59) = P(Z < 0.59) - P(Z \geq 0.59) = P(Z < 0.59) - (1 - P(Z < 0.59)) = 2P(Z < 0.59) - 1 = (2)(0.7224) - 1 = 0.4448.$

3. We let $X_1, \ldots, X_{10}$ denote the ten random variables. We have $P(X_1 + \cdots + X_{10} > 29) = P\Big(\frac{X_1 + \cdots + X_{10} - (10)(3)}{\sqrt{(10)(0.4)^2}} > \frac{29 - (10)(3)}{\sqrt{(10)(0.4)^2}}\Big) = P(Z > -0.79) = P(Z < 0.79) = 0.7852.$

4. We have $P(Y > 75) = P((X_1 + \cdots + X_5)/5 > 75) = P(X_1 + \cdots + X_5 > 375) = P\Big(\frac{X_1 + \cdots + X_5 - (5)(72.5)}{\sqrt{(5)(6.9)^2}} > \frac{375 - (5)(72.5)}{\sqrt{(5)(6.9)^2}}\Big) = P(Z > 0.81) = 1 - P(Z \leq 0.81) = 1 - 0.7910 = 0.2090.$