STAT/MA 41600
In-Class Problem Set #8: September 9, 2016
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Problem Set 8 Answers

1. We have $p_X(1) = P(X = 1) = (2/6)(1/4) + (4/6)(3/4) = 7/12$, and $p_X(0) = P(X = 0) = (2/6)(3/4) + (4/6)(1/4) = 5/12$.

2a. We have $p_X(x) = P(X = x) = (1 - 0.177)^{x-1}(0.177) = (0.823)^{x-1}(0.177)$ for $x \geq 1$, and $p_X(x) = 0$ otherwise.

2b. We have $F_X(x) = P(X \leq x) = \sum_{i=1}^{x}(1 - 0.177)^{i-1}(0.177) = 1 - (1 - 0.177)^x = 1 - (0.823)^x$ for $x \geq 1$. Alternatively, we compute $F_X(x) = P(X \leq x) = 1 - P(X > x) = 1 - (0.823)^x$ for $x \geq 1$.

2c. We have $p_Y(y) = P(Y = y) = (1 - (0.177)(0.90))^{y-1}(0.177)(0.90) = (0.8407)^{y-1}(0.1593)$ for $y \geq 1$, and $p_Y(y) = 0$ otherwise.

3. There are 21 equally likely pairs of outcomes on the dice with sum 7 or larger. So we get $p_X(7) = 6/21$; $p_X(8) = 5/21$; $p_X(9) = 4/21$; $p_X(10) = 3/21$; $p_X(11) = 2/21$; $p_X(12) = 1/21$.

4a. We have $p_X(1) = 3/5$ and $p_X(0) = 2/5$.
4b. We have $p_Y(1) = 3/5$ and $p_Y(0) = 2/5$.
4c. The probability mass functions are still the same, even if Bob chooses his cookie first.