

STAT/MA 41600
In-Class Problem Set #3: August 28, 2017

- 1.** A row of 5 empty seats is available to Jack and Diane. This week, they each choose their seat independently of their previous choices, and independently of what the other person does. (For instance, they might choose the same seat on the same day.)
 - 1a.** What is the probability that, throughout the 7-day week, they never happen to choose the same seat?
 - 1b.** What is the probability that neither of them picks any of the seats 2, 3, 4 during the 7-day week?
 - 1c.** What is the probability that there is always one or more seats between them, throughout the 7-day week?

- 2.** A student randomly picks a number between 1 and 10 (inclusive) every day during the 7-day week, and each day's pick is independent of all previous picks. What is the probability that the student's choices are strictly increasing during the week? (For example, one such pick is 2, 3, 4, 5, 8, 9, 10.)

- 3.** A game consists of rolling a pair of 6-sided dice repeatedly, until the sum is 12, and then stopping afterwards.
 - 3a.** During a game, what is the probability that a sum of 9 never occurs?
 - 3b.** During a game, what is the probability that none of the dice ever have the value 1?

- 4.** Consider a 20-sided die (an icosahedron) with values from 1 to 20. Roll the die one time. Let A denote the event that the value is even. Let B denote the event that the value is 13 or higher.
 - 4a.** Are A and B disjoint events? Why?
 - 4b.** Are A and B independent events? Why?
 - 4c.** Calculate $P(A \cup B)$ using the formula for inclusion-exclusion, namely, using the fact that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.