

Finite Math, MATH 1100 R06-R07-R10-R11

Fall 2020

Written Homework 3

Due Friday, October 30

Each student must submit his/her own individual copy, in pdf, into the shared Google folder.

1. The House Speaker needs to form an environmental panel with 3 members on it. She has to choose among 10 members: 4 from California, 3 from Colorado and 3 from Michigan.
 - (a) How many possible panels can she form?
 - (b) How many panels are possible, if one representative for each state must sit in the panel?
 - (c) How many panels consists of 2 members from California and 1 from Michigan?
 - (d) Moreover, the speaker has to assign 4 individual different projects to the 10 members. In how many ways can she do this?
2. The game of European roulette involves spinning a wheel with 37 slots: 18 red, 18 black and 1 green. A ball is spun onto the wheel and will eventually land in a slot, where each slot has an equal chance of capturing the ball. Gamblers can place bets on red or black. If the ball lands on their color, they win the money they bet. If it lands on another color, they lose the money they bet. Suppose you play roulette and bet \$3 on a single round. What is the expected value and standard deviation of your total winnings?
3. The National Vaccine Information Center estimates that 90% of Americans have had chickenpox by the time they reach adulthood. Find the probability that:
 - (a) 97 out of 100 randomly sampled American adults have had chickenpox;
 - (b) at most 3 out of 10 randomly sampled American adults have *not* had chickenpox;
4. In a multiple choice quiz there are 5 questions and 4 choices for each question. Robin has not studied for the quiz at all, and decides to randomly guess the answers. What is the probability that:
 - (a) the first question she gets right is the third one?
 - (b) she gets exactly 3 questions right?
 - (c) she gets the majority of the questions right?
5. Nancy and Karen play a game of cards as follows. Nancy draws 3 cards out of a regular deck of 52 cards without replacement: if she draws at least one ace, she wins. Otherwise, Karen wins. Suppose they play the game 10 times, and after each time, the cards are placed back in the deck and reshuffled.

- (a) Find the probability that Nancy wins exactly 4 times.
 - (b) Find the expected number of times Karen wins.
6. The U.S. Senate consists of 100 senators, 2 for each state. There are currently 47 Democrats and 53 Republicans senators. According to most sources covering the upcoming 2020 elections, 46 Democratic seats are safe, and only one (Alabama) will most likely flip to Republicans, while 8 Republican seats (Iowa, Colorado, Maine, Arizona, Montana, Georgia, North Carolina and South Carolina) are tossups, meaning they could flip to Democrats. Assuming the probability of flipping a tossup seat is 0.5, and that each state is independent of the others, find the probability that the Democrats in 2020 flip the Senate, which means they take at least 51 seats.