

Probability and Combinatorics Homework

1. A bakery brings out a freshly baked tray of cookies and offers the first person in line a free cookie. The tray contains 8 snickerdoodles, 12 sugar cookies, and 11 chocolate chip cookies. If the baker chooses 1 cookie at random from the tray of freshly baked cookies, what is the probability that the free cookie the first person in line receives will be a chocolate chip cookie?

(a) $\frac{1}{31}$

(b) $\frac{1}{11}$

(c) $\frac{8}{31}$

(d) $\frac{11}{31}$

(e) $\frac{12}{31}$

2. In her makeup bag, Kristy the actress has 4 lipsticks, 7 eyeshadows, and 3 mascaras. To do a full-face look she uses 1 lipstick, 1 eyeshadow, and 1 mascara. If each combination makes a different full-face look, how many different full-face looks can Kristy make?

(a) 7

(b) 14

(c) 28

(d) 33

(e) 84

3. A meteorologist is looking at the weather predictions for Saturday and Sunday. The meteorologist predicts there is a 30% chance of rain on Saturday and a 55% chance of rain on Sunday. Using the meteorologist's predictions, what is the probability to the nearest percent that it will rain both days?

(a) 14%

(b) 17%

(c) 18%

(d) 42%

(e) 43%

4. Salt Lake County is considering adding a new zip code to break up a large zip code area into a smaller zip code. If the county does this, they have insisted that the new five digit zip code must start with 88, but the last 3 digits can be chosen at random with each digit being a number from 0 through 9 inclusive. How many possible new zip codes are possible?
- (a) $8(9^3)$
 - (b) $8^2(9^3)$
 - (c) $8^2(10^3)$
 - (d) (9^3)
 - (e) (10^3)
5. The college sorority Beta Theta Phi has 42 members and is holding a meeting to choose their new sorority leader. The members decide that the leader, who they will choose at random, cannot be any of the 4 members currently holding other positions in the sorority. What is the probability that Francine, who is a sorority member, but does not hold another position, will be chosen as sorority leader?
- (a) 0
 - (b) $\frac{1}{38}$
 - (c) $\frac{1}{42}$
 - (d) $\frac{4}{38}$
 - (e) $\frac{4}{42}$
6. Justine always rotates the same seven breakfast items during the week, so that she does not eat the same thing twice. She rotates between eggs and bacon, pancakes, waffles, cereal, oatmeal, toast, and breakfast sandwiches. If this week she wants to have waffles on Tuesday and a breakfast sandwich on Friday, how many different ways can she arrange the rest of her breakfast meals during the week?
- (a) 14
 - (b) 24
 - (c) 120
 - (d) 280
 - (e) 5040

7. Of the 1200 people who use the Middle Valley Rec Center, 60% live in Middle Valley. Of the people who live in Middle Valley, 15% can walk to the rec center. What is the probability that a person who attends the rec center and is chosen at random will live in Middle Valley, but cannot walk to the rec center.

- (a) 9%
- (b) 12%
- (c) 51%
- (d) 75%
- (e) 85%

8. Draven is putting together Halloween bags for trick-or-treaters. He has 68 individual pieces of candy to choose from and each bag will have 6 pieces of candy in it. Of the 68 pieces of candy, 24 of them are chocolate. If Draven pulls a handful of 6 pieces out of random, what is the probability that he will grab 6 pieces of chocolate?

- (a) $\frac{{}^{24}C_6}{{}^{68}C_6}$
- (b) $\frac{{}^6C_6}{{}^{24}C_{24}}$
- (c) $\frac{{}^{24}P_6}{{}^{68}P_6}$
- (d) $\frac{{}^{68}C_6}{{}^{68}C_{24}}$
- (e) $\frac{{}^6C_1 \cdot {}^{24}C_6}{{}^{68}C_6}$