

**Math 321**  
**Lab #2**

1. Tom is playing a game on the Price is Right. He is given tags with prices on them. In order to win an item, he must place the correct tag on the item.
  - (a) How many ways can he arrange the 4 tags if there are 4 items? (24)
  - (b) If he is given 5 tags, how many ways can he arrange the tags when there are 4 items? (120)
  - (c) If he is given 5 tags and there are only 3 items, how many ways can he arrange the tags? (60)
2. A meeting is held with 10 individuals. If each person shakes hands with another person only once, how many handshakes occurred at the meeting? (45)
3. A woman has 11 close friends.
  - (a) Find the number of ways she can invite 5 of them to dinner. (462)
  - (b) Find the number of ways she can invite 5 of them to dinner, but where 2 of the friends are married and will not attend separately. (210)
  - (c) Find the number of ways she can invite 5 of them to dinner, but where 2 of the friends are not on speaking terms and will not attend together. (378)
4. A student must answer 10 out of 15 questions.
  - (a) How many choices are there? (3003)
  - (b) How many if the student must answer the first 3 questions? (792)
  - (c) How many if the student must answer one of the first three questions? (660)
5. A fair coin is tossed 4 times.
  - (a) Write out the sample space. (16 in total)
  - (b) Find the probability of getting exactly two heads in the four tosses. (.375)
6. A secretary types four letters (a,b,c,d) and their respective envelopes (A,B,C,D). Suppose that the letters are put randomly into the envelopes, one letter in each envelope.
  - (a) How many outcomes are there? (24)
  - (b) List the outcomes of the event A that exactly two letters end up in the wrong envelopes.
  - (c) Find  $P(A)$ . (.25)
7. Bob bought a used cell phone from a friend but forgot to ask what the 4 number password was to unlock it. What's the probability that Bob guesses the correct password assuming that he can't use the same number more than once.  $1.98 \times 10^{-4}$
8. Find the probability of winning the jackpot for Lotto 649 (you pick 6 numbers from 49 and you can't pick the same number more than once) if you bought one ticket containing one set of numbers.  $(7.15 \times 10^{-8})$
9. Find the probability of winning the jackpot for Super 7 (you pick 6 numbers from 49 and you can't pick the same number more than once) if you bought one ticket containing 3 different sets of numbers. Are your chances of winning higher for Super 7 than lotto 649?  $(3.49 \times 10^{-8})$
10. A meeting is attended by 10 teachers and 6 students .
  - (a) Find the number of ways that they can
    - (i) elect a president (16)
    - (ii) elect 2 representatives (120)
    - (iii) elect 2 representatives that are teachers (45)
    - (iv) elect 2 representatives (1 teacher and 1 student) (60)
    - (v) elect 3 representatives (2 teachers and 1 student) (270)

- (vi) elect 4 representatives (2 teachers and 2 students) (.675)
- (b) Find the probability of each of the events in (iii), (iv), (v), (vi) in (a). (.375), (.5), (.4821), (.3709)
11. Customers arriving at a grocery store can select any one of three counters for service. Suppose that two customers arrive at different times during the day and their selection of counters is observed.
- List the outcomes in the sample space. (9 in total)
  - List the outcomes of the event A that each counter received at least one customer. (0)
  - List the outcomes of the event B where counter 1 received at least 1 customer. (5)
  - Find  $P(B)$ . (.5556)
12. A small advertising firm consists of 2 men and 1 woman. The firm has two clients who are particularly difficult to deal with. To decide who sees the first client, one person is randomly selected from the three. The same procedure is followed for the second client. Note: It may help to write out the sample space.
- Find the probability that both clients are served by the same person from the advertising firm. (1/3)
  - Find the probability that both clients are served by men. (4/9)
  - Find the probability that the events of (a) and (b) occur simultaneously. (2/9)
13. Two standard dice are rolled simultaneously. Find the probabilities of the following events:
- the sum of the dice is an even number (1/2)
  - the sum of the dice is at least 8 (15/36)
  - the sum of the dice is not greater than 9 (30/36)
14. In the game of *craps*, a player rolls two balanced dice.
- The player wins on the first roll if the sum of the dice is 7 or 11. Find the probability of the winning. (0.2222)
  - The player loses on the first roll if the sum of the dice is 2,3,12. Find the probability of them losing. (0.1111)
  - Find the probability that either the sum of the dice is 8 or double are rolled. (.2778)
15. Suppose A and B are events such that  $P(A) = 0.3$ ,  $P(B) = 0.50$ , and  $P(A \cup B) = 0.60$
- Determine
    - $P(A \cap B)$  (.20)
    - $P(\bar{A} \cap \bar{B})$  (.40)
    - $P(\bar{A})$  (.70)
    - $P(\bar{B})$  (.5)
  - Are A and B mutually exclusive?
16. 56.5% of jail inmates are white, 94.0% are males, and 53.5% are white males. For a randomly selected jail inmate, find the probability of selecting
- a white or male inmate (.97)
  - a female (.06)
17. A survey of 50 randomly selected customers at a supermarket showed that 14 purchased milk and butter; 2 purchased butter and eggs; 23 purchased milk; 21 purchased butter and 12 did not purchase any of these items (milk, butter, eggs). Further, no one purchased milk and eggs. What is the probability that a person selected at random will buy:
- only eggs? (8/50)
  - eggs? (10/50)
  - milk and butter? (14/50)
  - milk and eggs? (0)
18. A certain company encourages its employees to participate in some type of physical activity. A survey revealed that 40% play golf, 50% fish and 25% play golf and fish. Define the events as

- A: play golf                      B: fishes
- (a)  $P(\bar{A} \cup B)$  (.85)
  - (b)  $P(A \cap \bar{B})$  (.15)
  - (c)  $P(A \cup B)$  (.65)
  - (d)  $P(\bar{A} \cap \bar{B})$  (.35)

19. A house is randomly chosen in Calgary. The probability is 0.35 that the house is occupied by a single parent and 0.03 that it is occupied by an elderly person ( who is not a single parent – not that they couldn't be.)
- (a) What is the probability the house chosen does not have a single parent as a resident? (.65)
  - (b) What is the probability the house chosen is occupied by single parent or an elderly person? (.38)
  - (c) What is the probability the house chosen does not have a single parent nor an elderly person living as a resident? (.62)