NYCCT MAT2572 Halleck Fall 2015 Practice exam 1 solutions

* You may use a scientific or graphing calculator.
* At the end of class, be sure to turn in your formula sheet (1 sheet, 2 pages, hand-written), worth 10%.

1. The formula **=B$2\*$A2** is located in cell **B1**.
   * 1. What does cell B1 evaluate to? 3\*2=6
     2. If this was copied and pasted into cell D3, what would resulting formula be?=D$2\*$A4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **A** | **B** | **C** | **D** |
| **1** | 2 | **=B$2\*$A2** | 4 | 5 |
| **2** | 3 | 3 | 8 | 6 |
| **3** | 5 | 4 | 3 | ????????? |
| **4** | 4 | 3 | 4 | 9 |

1. ****Consider an experiment that consists of withdrawing a ball from the box, replacing it, and withdrawing a second ball. Draw a tree diagram. Be sure to include labels and probabilities. Use the tree diagram to make a table with outcomes and probabilities. **Express all probabilities as fractions in lowest terms.** There are 2 red, 2 blue and 1 green ball in the box.

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* 1. What is the sample space of this experiment?

1st row of table above

* 1. As a set, what is the event A: the first ball drawn is red? What is its probability?

 probability is 10/25=2/5

* 1. As a set, what is the event B: the same color ball is drawn twice? What is its probability?

 probability is 9/25

1. On an outing of 100 students to a state park, 40 students brought neither a backpack nor a hat, 50 brought a hat, and 40 brought a backpack. If one of them was randomly chosen, find the probability that he or she brought
2. A backpack or a hat |HUB|=100-40 = 60

So P(HUB)=0.6

1. A backpack and a hat |H∩B|=|H|+|B|-|HUB|=50+40-60=30

So P(H∩B)=0.3

1. 2 fair 6-sided die are rolled (one green & one red) & the outcome is coordinate (green face, red face).
   1. Let A be the event that the faces sum to an even number greater than 8. Find P(A).

A={46,55,64,66} so P(A)=4/36=1/9

* 1. Let B be the event that the faces are the same (doubles). Find P(B).

B={11,22,33,…,66} so P(B)=1/6

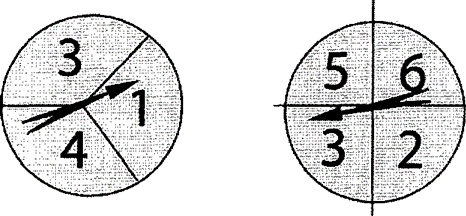
* 1. Find A **∩** B as set. Find P(A **∩** B).

A **∩** B={55,66} so P(A **∩** B)=2/16=1/18

* 1. Are A and B independent events? No, P(A)\*P(B)=1/54≠1/18= P(A **∩** B) (events are dependent).



1. In a game, each spinner is spun once and the results are added.



* 1. Use a tree to find paths to the outcomes and their probabilities

Since the outcomes for each path are equally likely, we don’t

need to use the tree to find probabilities. Instead we find the freqs.

* 1. Find the random variable that represents the game

(make a table with the possible outcomes and their probabilities).



1. Three cards are pulled from a deck of 52 cards. Find the probability of obtaining
   1. at least one club. Find complement (no club) b. a pair. choose face value of pair, then suits of

pair cards, then the nonpair card,

c. 3 of a kind: almost the same reasoning as for pair d. straight (3 cards whose face values

are in order, an ace can be lower than 2 or higher than king. Choose starting face (all except Q) & suits for each card

1. a flush (all 3 of the same suit) choose suit

and then face values for the 3 cards f. a straight flush: choose suit & starting face

1. use your answers to d, e, f to determine whether getting a straight and getting a flush are independent events. Does d\*e=f? I didn’t actually do the calculations, but my hunch is the answer is yes.
2. A jar contains 3 chocolate chip cookies and x oatmeal cookies. Two cookies are pulled from the jar without replacement.
   1. Find an expression that represents the probability one cookie is chocolate chip and the next cookie is oatmeal.



* 1. Find an expression that represents the probability one cookie is chocolate chip and the other cookie is oatmeal, regardless of the order in which they come out.



1. A 5 digit PIN number can begin with any digit (except zero) and the remaining digits have no restriction.
   1. If repeated digits are allowed, find the probability of the PIN code beginning with a 7 and ending with an 8. The middle 3 digits have no restriction so 10^3/(9\*10^4)
   2. If repeated digits are not allowed, find the probability of the PIN code is odd.

Do the last and first digits: 5 and 8 respectively, then the middle 3 are 8,7 and 6. Denominator is done similarly just do the last digit last.

It is a conditional probability. 5\*8^2\*7\*6/(9^2\*8\*7\*6)=P(O|NR)

* 1. Find the probability that the PIN code is odd if repeated digits are allowed.

Answer is clearly ½.

* 1. Are the events PIN is odd and PIN has no repeated digits independent?

There are many ways to check independence. One is P(O)\*P(NR)=P(O∩NR). However, we don’t have P(NR). Instead we check if P(O|NR)=P(O)

P(O|NR)=5\*8^2\*7\*6/(9^2\*8\*7\*6)=5\*8/9^2=40/81≠1/2= P(O) so the answer is no. Allowing no repeats slightly decreases the chance of getting an odd code.

1. There are 12 runners in a marathon. A person may bet on the race by predicting the top three runners and the order they finish in. If they do so correctly, the person wins the grand prize. There is a consolation price if they have selected the 3 top finishers but not the order. All runners have an equal chance of winning. Find the probability that a single bet will win
   1. the grand prize.1/(12\*11\*10)
   2. the consolation prize.

 you have a 5 times better chance of winning consolation prized than grand prize

1. A grocery store obtains 35% of its produce from vendor A, and 65% of its produce from vendor B. It is expected that spoilage will result in 12% of vendor A's produce and 17% of vendor B's produce to be discarded. Find the probability a randomly picked produce item came from vendor A, given that it was picked from the discard pile.

This is a Bayes Theorem Problem:

Chance that a random piece of fruit is spoiled is .P(S)=.35\*.12+.65\*.17

P(A|S)= 35\*.12/(35\*.12+.65\*.17)=.2754 about 2/7

