Kekoa Riggin
LING 473
HW 3

Question 1

*See end of document for tables of sample spaces

For each of these questions, Bayes theorum should be applied. I was unable to produce the correct results with bayes and resorted to mapping out the sample space.

Part a

P(X or Total = 7) = P(Dice roll) × P(Second roll is difference of 7 and first roll)
P(X) = P(A) × P(B)
P(X) = (6/6) × (1/6)
P(X) = 6/36 = 1/6 = 1.6667

Part b

Bayes should be used here, but I used sample space
P(Y or total >= 9) = 10/36 = 0.27778

Part c

Bayes should be used here. I used sample space.
P(Z or Roll 1 greater than Roll 2) = 15/36 = 0.416667

Question 2

Part a

158

Part b

P(. |nn) = 4/24

Part c

P(DT JJ) = 6/157

Part d

P(NN | DT JJ) = 5/6

Part e

P(DT JJ | NN) × P(NN) = P(NN — DT JJ) × P(DT JJ)
P(DT JJ | NN) = $\frac{P(NN|DTJJ) \times P(DTJJ)}{P(NN)}$
P(DT JJ | NN) = $\frac{(5/6) \times (6/157)}{24/158}$
P(DT JJ | NN) = 395/1884 = 0.20966

Question 3

The only open vowels in this set are *gnat* and *sand*. This means that there are 10 out of 12 vowels that are close. However, given the grouping of words to select from, the probability of choosing a close vowel rathern than an open one is not simply 10/12.

P(A) = 1/3
P(Close | A) = 1/2

P(B) = 1/3
P(Close | B) = 2/2

P(C) = 1/3
P(Close | C) = 3/4

P(Close) = P(Close—A) + P(Close—B) + P(Close—C) = 9/12 = 0.75

Question 4

Part a

The probability that we select a positive document from C is 2/6. We must multiply this probability by the probability of this same document being seleceted from not C in the next step in order to find the total probability of selecting a positive document.

P(X or Selecting a positive document from not C) = P(I Chooing positive doc we know is in not C) + (P(J Choosing doc we moved from C) × P(K Moving positive doc from C to not C)
P(X) = 1/3 + (1/3 × 2/6) = 8/18 = 0.4444

Part b

For this question, we must use Bayes Theorum to find P(B—A) after already knowing P(A—B) from the previous question.
The probability of picking a positive doc, given that a positive do was moved from C to not C is 2/3 because that would make 2 positive docs and 1 not positive doc in set not C. The probability of moving a positive doc from C to not C is 1/3. This means our first equation is:

P(A|B)×P(B) = 2/3 × 1/3 = 2/9

Knowing this, we can divide the left side of the equation by P(A), which we take from the question above, to find P(B|A):
$\frac{P(A|B)\times P(B)}{P(A)}$
$\frac{2/3\times 1/3}{8/18} = 1/2 = 0.5$

Tables

Table 1: Q1 Part a: Two Dice Total = 7

-	1	2	3	4	5	6
1	-	-	-	-	-	X
2	-	-	-	-	X	-
3	-	-	-	X	-	-
4	-	-	X	-	-	-
5	-	X	-	-	-	-
6	X	-	-	-	-	-

Table 2: Q1 Part b: Two Dice Total = 9

-	1	2	3	4	5	6
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	-	-	-	-	-	X
4	-	-	-	-	X	X
5	-	-	-	X	X	X
6	-	-	X	X	X	X

Table 3: Q1 Part c: Second Roll Higher than First

-	1	2	3	4	5	6
1	-	X	X	X	X	X
2	-	-	X	X	X	X
3	-	-	-	X	X	X
4	-	-	-	-	X	X
5	-	-	-	-	-	X
6	-	-	-	-	-	-