

MSPA 400 Session 4 Python Solutions

Module 1

Exercise: Duplicate Examples 6 and 7 from Lial Section 7.1. Compare your code to the answers.

```
print ('Example 6 Set Operations\n')
U=set([0,1,2,3,4,5,6,7,8,9,10])
A=set([3,6,9])
B=set([2,4,6,8])
print ('U is %s ' %U)
print ('A is %s ' %A)
print ('B is %s ' %B)
print('\nA intersection B is %s') %(A&B)
Bc=U-B
print('\nA intersection B complement is %s') %(A&Bc)
```

```
print ('Example 7 Union of Sets\n')
U=set([0,1,2,3,4,5,6,7,8,9,10,11,12])
A=set([1,3,5,7,9,11])
B=set([3,6,9,12])
C=set([1,2,3,4,5])
print ('U is %s ' %U)
print ('A is %s ' %A)
print ('B is %s ' %B)
print ('C is %s ' %C)
print ('\nA union B is %s') %(A|B)
Cc=U-C
print ('Union of A and B intersected with C complement is %s ') %((A|B)&Cc)
```

Example 6 Set Operations

U is set([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10])
A is set([9, 3, 6])
B is set([8, 2, 4, 6])

A intersection B is set([6])

A intersection B complement is set([9, 3])

Example 7 Union of Sets

U is set([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12])
A is set([1, 3, 5, 7, 9, 11])
B is set([9, 3, 12, 6])
C is set([1, 2, 3, 4, 5])

A union B is set([1, 3, 5, 6, 7, 9, 11, 12])
Union of A and B intersected with C complement is set([9, 11, 12, 6, 7])

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Module 2

Exercise: Refer to Section 7.6 of Lial. Using the sets defined above and set operations, apply Bayes' Theorem. Calculate the conditional probability of A given C, and the probability of C given A.

```
P=round(len(A&C)/float(len(C)),3)
print ('Conditional probability of A given C is %r') %P
Q=len(C)/T
print ('Probability of C is %r') %round(Q,3)
Qc=1.0-Q
print ('Probability of C complement is %r') %round(Qc,3)
R=round(len(A&(U-C))/float(len(U-C)),3)
print ('Conditional probability of A given C complement is %r') %R
Bayes_Result= Q*P/(Q*P+R*Qc)
print ('Bayes Result for Probability of C given A %r') %(Bayes_Result)
```

```
Conditional probability of A given C is 0.462
Probability of C is 0.5
Probability of C complement is 0.5
Conditional probability of A given C complement is 0.538
Bayes Result for Probability of C given A 0.462
```