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#############
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# Pledge: I plege my honor that I have abided by the Stevens Honor System
# Description: Homework 1
#############
Problem 1

n = AND
u = OR

a) A = {SSF,SFS,SFF}
b) B = {SSS,SSF,SFS,FSS}
c) C = {SSS,SSF,SFS}
d) C' = {SFF,FSS,FSF,FFS,FFF}
   A u C = {SSS,SSF,SFS,SFF}
   A n C = {SSF,SFS}
   B u C = {SSS,SSF,SFS,FSS}
   B n C = {SSS,SSF,SFS}

Problem 2

a) S = {3,4,5,13,14,15,23,24,25,123,124,125,213,214,215}
b) A = {3,4,5}
c) B = {5,15,25,125,215}
d) C = {3,4,5,23,24,25}

Problem 3

a) 7%
b) 15% + 10% + 5% = 30%
c) 100% - (18% + 25%) = 57%

Problem 4
P(A1) = .22
P(A2) = .25
P(A3) = .28
P(A1 n A2) = .11
P(A1 n A3) = .05
P(A2 n A3) = .07
P(A1 n A2 n A3) = .01

a) A1 u A2 = P(A1) + P(A2) - P(A1 n A2) =
   .22 + .25 - .11 =
   .46
b) A1' n A2' = (A1 u A2)' =
   1 - (A1 u A2) =
   1 - .46      // as defined in 4.a
   .54
c) A1 u A2 u A3 = P(A1) + P(A2) + P(A3) - P(A1 n A2) - P(A1 n A3) - P(A2 n A3) +
 P(A1 n A2 n A3) =
   .22 + .25 + .28 - .11 - .05 - .07 + .01 =
   .53
d) A1' n A2' n A2' = (A1 u A2 u A3)' =
   1 - .53      // as defined in 4.c
e) A1' n A2' n A3 = P(A3) - P(A2 n A3) - P(A1 n A3) + P(A1 n A2 n A3) =
   .28 - .05 - .07 + .01 =
   .17
f) (A1' n A2') u A3 = (A1 u A2)' u A3
   P(A1' u A2') + P(A3) - P(A1' n A2' n A3) =
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   .54 + .28 - .17      // .54 defined in 4.b and .17 is defined in 4.e
   .65

Problem 5
key =   D => Day
        S => Swing
        N => Night
        US => Unsafe Conditions
        UR => Unrelated to Conditions
a) Simple Events = {DUS,DUR,SUS,SUR,NUS,NUR}
b) P(US) = P(DUS) + P(SUS) + P(NUS) =   // No need for calculating P(DUS n SUS)
becuase these events are simple
   10% + 8% + 5% =
   23%
c) P(D') = 100% - P(D) =
   100% - P(DUC) + P(DUR)       // P(DUC) and P(DUR) are simple events
   100% - 10% - 35% =
   55%

Problem 6

a) 3A's 3B's 3C's 3D's =
   9! / (3! * 3! * 3! * 3!) =
   15120
   // 9! comes from the number of total possible combinations given A1, A2, etc.
   // dividing by 3! * 3! * 3! * 3! comes from removing the Permutations A1, A2,
 etc.

b) Assuming all the outcomes are equally likely,
   I computed the number of outcomes that satisfy adjacency
   The result 4! can then be divided by the total number of outcomes
   Which gives me 24/15120 =
   1/630
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