

## Stat 50 – Worksheet #2: Operations on Events

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1. Bowl 1 contains slips of paper numbered 1,2,8. Bowl 2 contains slips of paper numbered 3,4,7,9. One slip of paper is randomly selected from each bowl. One possible outcome of this experiment is that the 8 was drawn from Bowl 1 and the 7 drawn from Bowl 2; this outcome may be represented as the ordered pair, (8,7).
  - (a) Write out the sample space,  $\mathcal{S}$  for this experiment. (Note there are 12 possible outcomes in  $\mathcal{S}$ .)
  - (b) Let  $A$  be the event that both numbers drawn are even. List the outcomes in  $A$ .
  - (c) Let  $B$  be the event that at least one number is even. List the outcomes in  $B$ .
  - (d) Let  $C$  be the event that the sum of the numbers is more than 10. List the outcomes in  $C$ .
  - (e) List the outcomes in  $A \cap C$ .
2. A number is randomly selected from the sample space below:

$$\mathcal{S} = \{2, 5, 7, 8, 17, 25, 100\}$$

Define events as follows:

$A$  = the number under 10

$B$  = the number is evenly divisible by 5

$C$  = the number is even

Write out the outcomes in the following events:

- (a)  $A$
  - (b)  $B$
  - (c)  $A^C$
  - (d)  $A \cap C$
  - (e)  $A \cup C$
  - (f)  $A^C \cap B^C$
  - (g) Calculate  $P(A \cup C)$  as the number of outcomes in the event  $A \cup C$  divided by the number in the sample space,  $\mathcal{S}$
  - (h) Calculate  $P(A \cup C)$  using the Addition Rule  
 $P(A \cup C) = P(A) + P(C) - P(A \cap C)$  and compare it to your answer from the previous part.
  - (i) Are the events  $B$  and  $C$  mutually exclusive? Justify your answer using this specific sample space.
3. In a study of college students, data are collected on whether or not each subject lives on-campus and whether or not the subject studies in the library. 58% of the subjects live on campus and 40% study in the library. 25% live on campus and study in the library. What is the probability a randomly selected subject

- (a) lives off-campus
- (b) lives on-campus or studies in the library
- (c) lives on-campus and does not study in the library
- (d) neither lives on-campus nor studies in the library