

MA 110 SECTION 8.2: UNION, INTERSECTION, & COMPLEMENTS OF EVENTS

HOMEWORK: 1, 3, 5, 19, 21, 23, 25, 27, 29, 31, 33, 35, 39, 41, 45, 51, 71, 73, 75, 77

Suppose that two fair dice are rolled. See the complete Sample Space on page 408. The sample space has 36 outcomes – with each individual outcome (simple event) equally likely to occur.

1. Listing outcomes in a described event:

Let $A =$ " A three is rolled "

Let $B =$ " A sum of seven is rolled"

2. Union of events

$A \cup B =$ " A three is rolled or a sum of the dice is seven"

3. Inclusive/Exclusion Principle: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

4. Intersection of events

$A \cap B =$ " A three is rolled and the sum of the dice is seven"

5. The complement rule:

Let $C =$ " A sum of 12 is rolled" then $C = \{(6, 6)\}$

$D =$ "Sum of the dice is less than 12"

$P(D) =$

8. **THE BIRTHDAY PROBLEM (Example 5) page 411 - 412**

9. **PROBABILITY AND ODDS page 412 - 413**

A. From probability to odds:

Given an event E the odds for E are $p(E)/p(E')$ (Recall: $p(E') = 1 - p(E)$)

Suppose the probability of winning a game is .4, then the odds for winning the game are $.4/.6 = 4/6 = 2/3 \rightarrow 2$ to 3

The odds against winning are 3 to 2.

B. From Odds to probability:

If the odds for an event E are a to b (or a/b) then $p(E) = a/(a + b)$

Suppose the odds in favor of an event E are 5 to 9 then $p(E) = 5/(5 + 9) = 5/14$.

C. Convert the probabilities to odds:

i. $P(E) = 0.6$

ii. $p(F) = 0.82$

D. Convert the odds to probabilities:

i. The odd for G are 45 to 4

ii. The odds for H are 3 to 19