11.3 Mutually Exclusive

Definitions:

a) inclusive events- events that CAN occur at the same time

b) mutually exclusive events - events that CANNOT occur at the same time

Probability of A or B

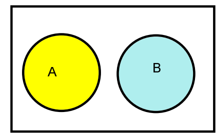
- If A and B are **MUTUALLY EXCLUSIVE** events then
  P(A or B) = P(A) + P(B)

- If A and B are **INCLUSIVE** events then
  P(A or B) = P(A) + P(B)- P(A and B)

Remember that P(A and B) Means the intersection of A & B

Mutually Exclusive

1,2, 3,4,5,6



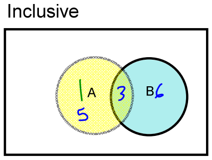
Sample Space

Example 1: Find the probability of rolling an odd number or a 2 on a die.

P(odd or 2) = P(odd)+ P(2) =

$\frac{3}{6} + \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$

Inclusive



Sample Space

Example 2: Find the probability of rolling an odd number or a multiple of 3 on a die.

P(odd or Mult of 3)= P(odd)+P(mult 3)-P(odd and Mult 3) =

$\frac{3}{6} + \frac{2}{6} - \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$

Examples from the old book on page 654

	Men	Women	Total
Favor	18	9	27
Oppose	12	25	37
No Opinion	20	16	36
Total	50	50	100

Example 3: Find the probability that a randomly selected respondent to the survey opposes or has no opinion about the change in policy.

¿ Are these events mutually exclusive or inclusive?

P(oppose or no opinion)= P(oppose)+P(no opinion)

$\frac{37}{100} + \frac{36}{100} = \frac{73}{100}$

Example 4: Find the probability that a randomly selected respondent to the survey is a man or opposes the change in policy.

¿ Are these events mutually exclusive or inclusive?

P(man or oppose)= P(man)+P(opposes)- P(man *and* opposes)

$\frac{50}{100} + \frac{37}{100} - \frac{12}{100} = \frac{87-12}{100} = \frac{75}{100} = \frac{3}{4}$

Probability of a Complement of A

A sample space is really broken into 2 parts A and not A
the not A portion is the complement to A

$P(A)+P(A^C)=1$ $\quad P(A)=1-P(A^C)$ $\quad P(A^C)=1-P(A)$

For example: Results on a test could be looked at as:

Those who passed the test and those who did not pass.

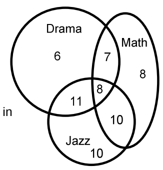
Those who got an A and those who did not.

Those who got a C and those who did not.

These are all different ways to look at the data in just 2 groups.

Ex 5: The drama, math and jazz clubs have 32,33,and 39 members respectively.

Find the probability that a randomly selected club member belongs to at least two clubs.



Let A be the membership in exactly 1 club. Then A^c represents membership in more than one club (2 or 3 clubs)

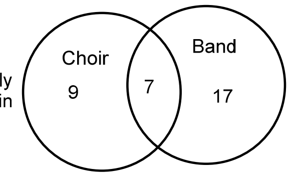
$P(A^C)=1-P(A)$

$$=1-\frac{6+8+10}{60}=1-\frac{24}{60}$$

$$=\frac{36}{60}=.6=60\%$$

$TOTAL = 6+7+8+11+8+10+10$
$= 60$

Example 6:
What is the probability that a randomly selected musically inclined person is in both band and choir? $\frac{7}{33}$



What is the probability that a randomly selected musically inclined person is in only in one group?

$$1-\frac{7}{33}=\frac{26}{33}$$