4.2 Events

GOALS:

1. Use Venn Diagrams to help understand which individuals in population have certain characteristics.

2. Understand differences between events having both conditions and events having either condition.

Study Ch. 4.2, # 41(37), 48(39), 53(41), 57(45), 55(43), 59(47)

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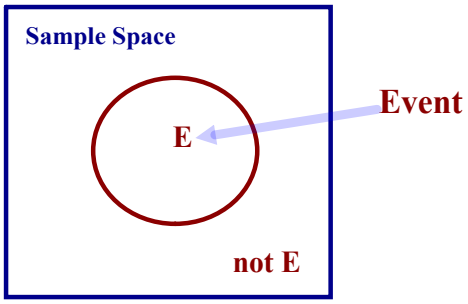
4.2 Events

Sample Space: collection of all possible outcomes

Event: collection of outcomes with specified characteristic; subset of sample space



Venn Diagram

not E: complement of E
outside E, inside sample space

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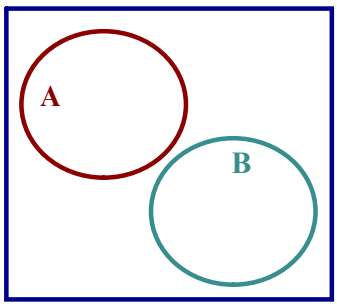
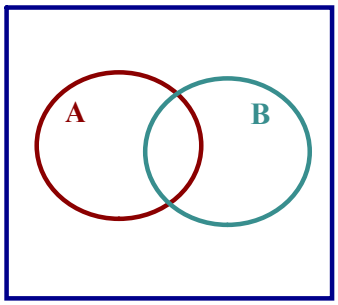
4.2 Events

Suppose have two events, A and B
How many regions in each sample space?





_____ Regions

_____ Regions

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4.2 Events

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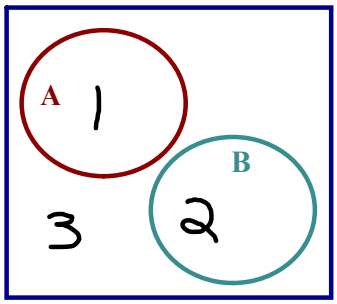
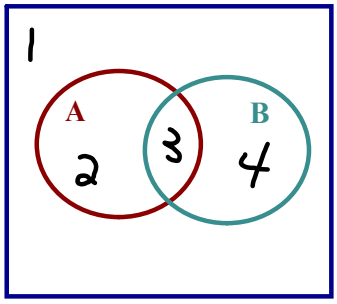
How many regions in each sample space?





3 Regions

4 Regions

Note: If region 3 is empty, then the right one is essentially the same as the left.

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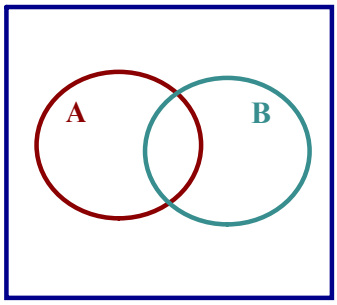
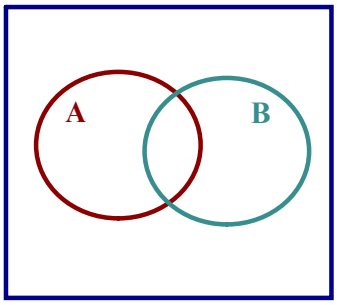
4.2 Events

Shade (A & B)
in both A and B



Shade (A or B)
in either A or B or both



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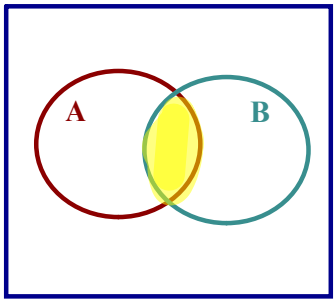

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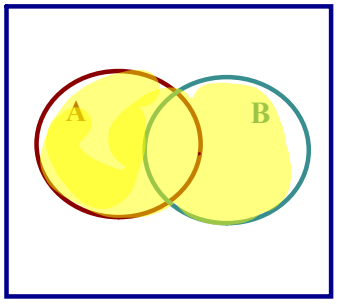

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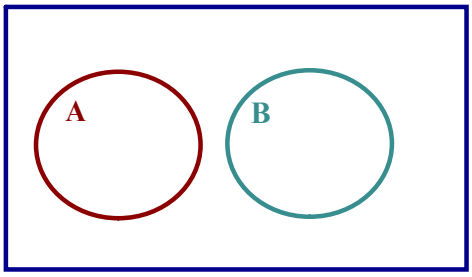
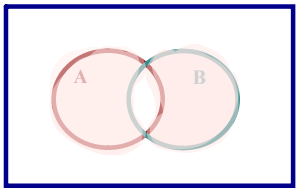
4.2 Events

Mutually Exclusive Events: Events with no common outcome(s)



coffee (A)
or tea (B)



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4.2 Events

Mutually Exclusive Events:
Events with no common outcome(s)

	SUPER BOWL WINNERS		
	TEAM	WINS	Rel Freq
NE	New England Patriots	6	0.111
PI	Pittsburgh Steelers	6	0.111
DA	Dallas Cowboys	5	0.093
SF	San Francisco 49ers	5	0.093
GB	Green Bay Packers	4	0.074
NYG	New York Giants	4	0.074
DE	Denver Broncos	3	0.056
W	Washington Redskins	3	0.056
BA	Baltimore Ravens	2	0.037
KC	Kansas City Chiefs	2	0.037
M	Miami Dolphins	2	0.037
OA	Oakland Raiders	2	0.037
CO	Balt/Indian Colts	2	0.037
CH	Chicago Bears	1	0.019
LA	Los Angeles Raiders	1	0.019
NO	New Orleans Saints	1	0.019
NYJ	New York Jets	1	0.019
PH	Philadelphia Eagles	1	0.019
SE	Seattle Seahawks	1	0.019
ST	St. Louis Rams	1	0.019
TB	Tampa Bay Buccaneers	1	0.019
21		54	1

Are these events mutually exclusive?
- Event PI
- Event NYG
- Event DA
- Event OA
- Event NYJ
- Event LA

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4.2 Events

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21		54	1

M.E.? Yes.

eg: Event P
Event NYG
Event DA
Event OA
Event NYJ
Event LA

What about the events
* being a team on the east coast and
* being a team in the northeast?

Are these events M.E.?

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4.2 Events

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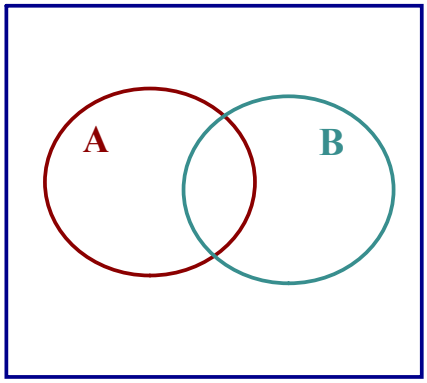
	21		54	1

M.E.?

A What about the events > being a team on the east coast and
B >being a team in the northeast?
M.E.?



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4.2 Events Mutually Exclusive Events:
Events with no common outcome(s)

M.E.

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eg: Event P
Event NYG
Event DA
Event OA
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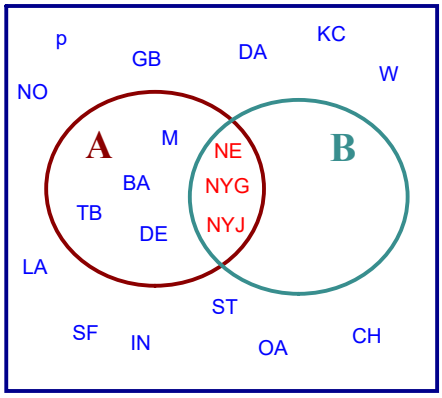
M.E.?



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4.2 Events Mutually Exclusive Events:
Events with no common outcome(s)

M.E.

SUPER BOWL WINNERS

eg: Event P
Event NYG
Event DA
Event OA
Event NYJ
Event LA

What about the events > being a team on the east coast and >being a team in the northeast?
M.E.?

NO

NOT Mutually Exclusive

Eastcoast:
NYG, NE, BA, M, NYJ, TB

Northeast:
NE, NYG, NYJ

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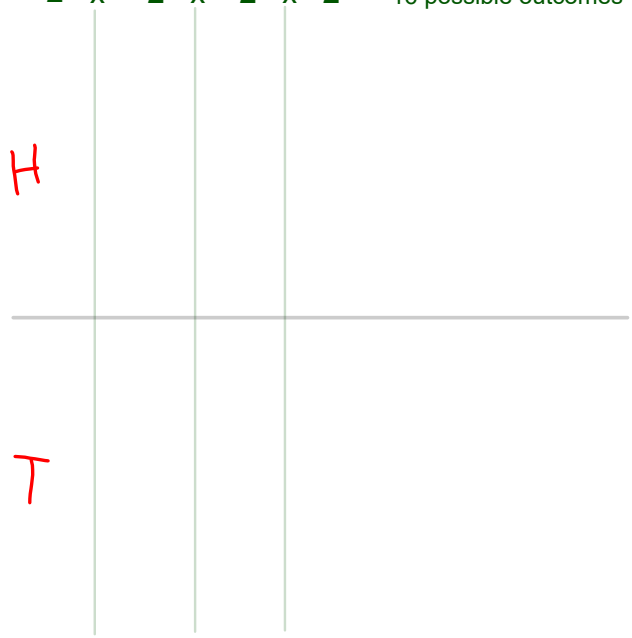
4.2 Events

Toss a dime four times. How many possible outcomes are there?
What are the possibilities?

1st 2nd 3rd 4th toss

2 x **2** x **2** x **2** = 16 possible outcomes



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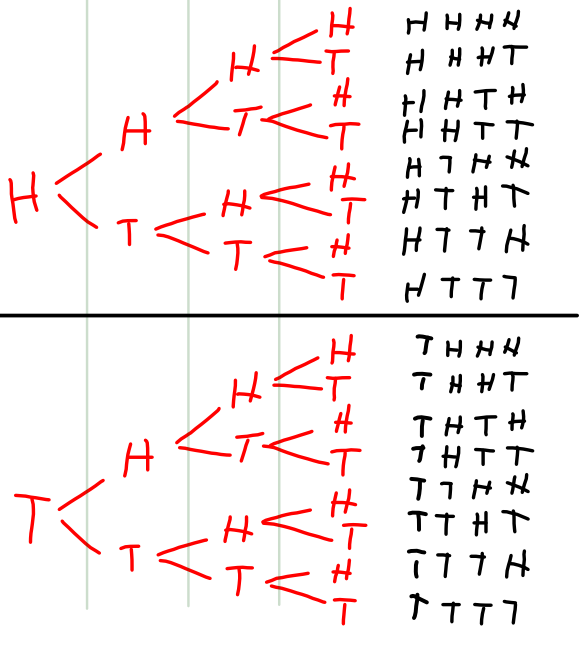

Two possible outcomes for each toss. There are 4 tosses, so:

Number of possible outcomes =

$2^4 = 2^4$

Here ORDER matters, since HHTT is a different outcome from HTHT and THTH, etc.

NOT $_nC_r$

where order does not matter and HHTT is same as HTHT, etc.
id: H or T ***repeats*** (or can be selected) each time

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4.2 Events p. 159 # 44, 48

HHHH	THHH
HHHT	THHT
HHTH	THTH
HHTT	THTT
HTHH	TTHH
HTHT	TTHT
HTTH	TTTH
HTTT	TTTT

Event A: exactly 2 heads

Event B: first 2 tosses are tails

Event C: first toss is heads

Event D: all 4 tosses are the same

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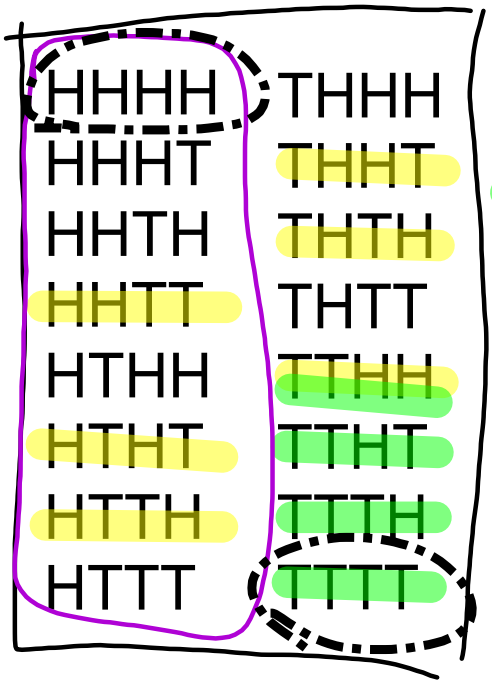
4.2 Events p. 159 # 44, 48



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21		54	1

Next step: use events to find probability

P(M) ?

F: probablility that a Super Bowl team selected at random is either Miami.

P(M or TB) ?

F: probablility that a Super Bowl team selected at random is either Miami or Tampa Bay.

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Next step: use events to find probability

P(M) ? =0.037

F: probablility that a Super Bowl team selected at random is either Miami.

P(M or TB) ?

F: probablility that a Super Bowl team selected at random is either Miami or Tampa Bay.

M and TB are M.E. so no overlap, ∴
simply add. (If there is overlap, then not ME and need to be careful not to count the overlap twice.)

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