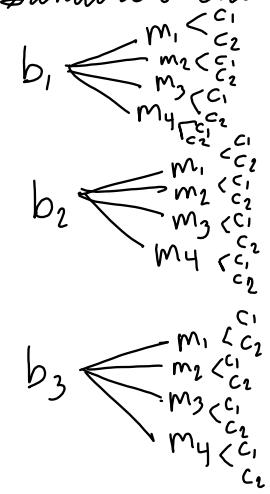
Sec. 11.1 Permutations and Combinations

Fundamental Counting Principle

If event M can occur in m ways and is followed by event N that can occur in n ways, then even M followed by event N can occur in $m \cdot n$ ways

Ex: 3 bread choices, 4 meat choices, 2 cheese choices.

Sandwich choices:



$3 \times 4 \times 2 = \boxed{24}$

Permutation an arrangement of items in a particular order

$${}_nP_r = \frac{n!}{(n-r)!}$$

n: total # of items; r: # of choices

Ex: 20 in a race, 1st – 3rd place

$${}_{20}P_3 = 20 \cdot 19 \cdot 18 = 6840$$

Ex: ${}_8P_5 = 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 = 6720$

Factorials.

$$n! = n \cdot (n-1) \cdot (n-2) \cdots 1$$

Ex: $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$

Combination
an arrangement of items; order doesn't matter

ABC
ACB

$${}_{20}C_3 = \frac{20 \cdot 19 \cdot 18}{3 \cdot 2 \cdot 1}$$

$$C = \frac{n!}{r!(n-r)!}$$

Ex: ${}_4C_3 = \frac{4 \cdot 3 \cdot 2}{3 \cdot 2 \cdot 1} = 4$

ABCD

ABC	BCD	ACD	ABD
ACB	BDC	ADC	ADB
BAC	CBD	CAD	DBA
BCA	CDB	CDA	DAB
CAB	DBC	DAC	BAD
CBA	DCB	DCA	BDA

Sec. 11.2 Probability

experimental probability:

$$P(\text{event}) = \frac{\text{number of times event occurs}}{\text{number of trials}}$$

simulation: a model of the event

sample space: the set of all possible outcomes

equally likely outcomes: each outcome has the same chance of occurring.

theoretical probability:

$$P(A) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$