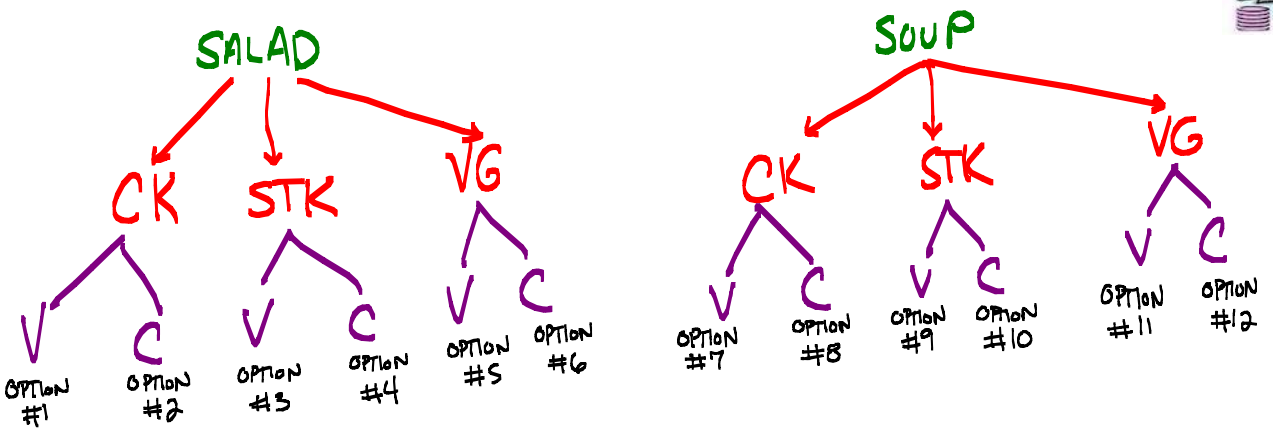
Sec 1.2 -Analyzing Numerical Data
Counting Principle

Name:

1. Justine is a wedding coordinator. She is selecting the menu options for the reception.
   - First, she will give the guests a choice of Salad or Soup for the first course.
   - Then, she will allow them to pick from a chicken, steak, or a vegetarian for their main course.
   - Finally, she will allow the guests to choose bride's vanilla cake or groom's chocolate cake.

Create a tree diagram showing every plausible dinner a guest could select:



How many outcomes are possible? 12 DIFFERENT MEALS.

Show how you could use the counting principle to determine the number of outcomes.

$\underbrace{2}_{\text{FIRST}} \cdot \underbrace{3}_{\text{SECOND}} \cdot \underbrace{2}_{\text{THIRD}} = 12$ OUTCOMES

2. At a New Car Dealership, a particular model comes in 4 different trim levels (CX, DX, EX, and Si). The same model comes in 5 different colors (Night Black, Pearl White, Evening Blue, Sandy Red, and Forest Green). The model of car also has 3 different interior options (Grey Cloth, Tan Cloth, Black Leather). How many different versions of this model can be created from these options?

$\underbrace{4}_{\text{TRIM LEVELS}} \cdot \underbrace{5}_{\text{EXTERIOR COLORS}} \cdot \underbrace{3}_{\text{INTERIOR CHOICES}} = 60$ POSSIBLE VERSIONS

3. A seven digit telephone number is of the form ABC-DEFG. In one particular state, the digit 'A' is restricted to any number between 1 and 9. The digits B and C are restricted to any number between 2 and 9. The digits D,E,F, and G have no restriction. How many seven digit phone numbers are possible with these restrictions?

$\underbrace{9}_{\text{"A"}} \cdot \underbrace{8}_{\text{"B"}} \cdot \underbrace{8}_{\text{"C"}} \cdot \underbrace{10}_{\text{"D"}} \cdot \underbrace{10}_{\text{"E"}} \cdot \underbrace{10}_{\text{"F"}} \cdot \underbrace{10}_{\text{"G"}} = 5{,}760{,}000$ PHONE NUMBERS

"A": ANY DIGIT 1-9 PROVIDES 9 CHOICES

"B" "C": ANY DIGIT 2-9 PROVIDES 8 CHOICES FOR EACH SPACE.

"D" "E" "F" "G": ANY DIGIT 0-9 GIVES AN OPTION OF 10 CHOICES FOR EACH SPACE

4. A ten digit telephone number is of the form (XYZ) – ABC –DEFG. In one particular state, there are 4 possible area codes (202, 341, 602, and 581). The digit 'A' is restricted to a number 2 through 8. The digits B and C can be any number but they cannot repeat. The digits D,E,F, and G have no restriction. How many seven digit phone numbers are possible with these restrictions?

$\underbrace{4}_{\text{AREA CODE (4 CHOICES)}} \cdot \underbrace{7}_{\text{"A" ANY DIGIT 2-8}} \cdot \underbrace{10}_{\text{"B"}} \cdot \underbrace{9}_{\text{"C" ANY DIGIT 0-9 BUT CANNOT REPEAT}} \cdot \underbrace{10}_{\text{"D"}} \cdot \underbrace{10}_{\text{"E"}} \cdot \underbrace{10}_{\text{"F"}} \cdot \underbrace{10}_{\text{"G" 0-9 GIVES AN OPTION OF 10 CHOICES.}} = 25{,}200{,}000$ PHONE NUMBERS

(7 CHOICES) (10 CHOICES) (9 CHOICES)

5. How many area codes of the form (XYZ) are possible if the digit 'X' and 'Y' can be any number 1 through 9 and the digit 'Z' can be any number 2 through 9?

$9 \cdot 9 \cdot 8 = 648$ AREA CODES

"X": ANY DIGIT 1 – 9 (9 CHOICES)
"Y": ANY DIGIT 1 – 9 (9 CHOICES)
"Z": ANY DIGIT 2 – 9 (8 CHOICES)

6. A seven digit telephone number is of the form ABC-DEFG. In one particular state, the digit 'A' can be any digit except 0 and 1. The digits B and C can be any digit from 2 - 9. The digits D, E, F, and G can be any digit 0 – 9 except they can't all be the same (e.g. 0000, 1111, 2222, ...etc.). How many seven digit phone numbers are possible with these restrictions?

$(8 \cdot 8 \cdot 8) \cdot (10 \cdot 10 \cdot 10 \cdot 10 - 10) = 5{,}114{,}880$ PHONE NUMBERS

"A": CAN BE ANY SINGLE DIGIT EXCEPT 0 AND 1 (8 CHOICES)
"B": CAN BE ANY DIGIT 2 - 9 (8 CHOICES)
"C": CAN BE ANY DIGIT 2 - 9 (8 CHOICES)
"D": INITIALLY CAN BE ANY DIGIT 0 - 9 (10 CHOICES)
"E": INITIALLY CAN BE ANY DIGIT 0 - 9 (10 CHOICES)
"F": INITIALLY CAN BE ANY DIGIT 0 - 9 (10 CHOICES)
"G": INITIALLY CAN BE ANY DIGIT 0 - 9 (10 CHOICES)
-10: GETS RID OF THE EXCLUSION OPTIONS OF WHICH THERE ARE 10 (0000, 1111, 2222, ...etc.)

7. A student number for a high school requires that student identification number consist of 6 characters. The first 4 characters can be any number without restriction. The last 2 characters are letters and cannot repeat. How many student ID's are possible?

$10 \cdot 10 \cdot 10 \cdot 10 \cdot 26 \cdot 25 = 6{,}500{,}000$ STUDENT ID'S

ANY SINGLE DIGIT 0-9 WITHOUT RESTRICTION
ANY LETTER A-Z BUT CANNOT REPEAT 26 LETTERS OF ENGLISH ALPHABET

8. A lock on a fence door has a 3 digit combination. Each digit can be any number between 1 – 8. The only restriction is that all 4 characters cannot be the same (e.g. 111, 222, 333, etc.). How many combinations are possible?

$8 \cdot 8 \cdot 8 - 8 = 504$

ANY NUMBER 1 - 8
ANY NUMBER 1 - 8
ANY NUMBER 1 - 8
-8: GETS RID OF EXCLUSIONS (111, 222, 833, etc.)

9. A suitcase has a lock on it consisting of four numbers. Each number could be any number 0-9. The only restriction is that two numbers in a row cannot be the same (e.g. you couldn't use 3224 because the 2's are adjacent but you could use 3434 since none of the same numbers are adjacent).

$10 \cdot 9 \cdot 9 \cdot 9 = 7290$ COMBINATIONS

10: CAN BE ANY DIGIT 0 - 9
9: CAN BE ANYTHING 0-9 EXCEPT JUST THE NUMBER TO THE LEFT
9: CAN BE ANYTHING 0-9 EXCEPT JUST THE NUMBER TO THE LEFT
9: CAN BE ANYTHING 0-9 EXCEPT JUST THE NUMBER TO THE LEFT