Grade 12 Data Management

1. BELLWORK: Get QQ from folder
2. Take up HW
3. 5.3 - Solving Problems with Combinations

All Possible Combinations (Distinct Items)

Ex #1  You go to a store and there are only 3 cookies left. How many different purchase combinations could you make?

There are at least 3 different ways to get the same answer. Which did you use?

Then, create a formula to generate the number of choices:

\[ 2^n \quad \text{using all items} \]
\[ 2^n - 1 \quad \text{if you must pick at least ONE} \]
Ex #2  How many sums of money can be made from $1, $2, a $5 and a $10 bill?

Slow Method: 

= 1 \times 2 \times 2 \times 1 = 4 \text{ sums}

Fast Method: For each bill, either add it in or don't (2 possibilities).

= 2^4 = 16 \text{ different sums.}

Ex #3  How many ways can a committee be made from 5 people if you must have at least one person on a committee?

\[ C(5, 1) = 5 \]

\[ C(5, 2) = 10 \]

\[ C(5, 3) = 10 \]

\[ C(5, 4) = 5 \]

\[ C(5, 5) = 1 \]

All Possible Combinations (Identical Items)

Ex #4  A bag of marbles has 2 red, 3 blue and 5 green. If you pick without looking, how many different selections could you make?

- Red: \( C(2, 2) \times C(4, 0) = 1 \)
- Blue: \( C(3, 4) \times C(6, 0) = 3 \times 1 = 3 \)
- Green: \( C(5, 4) \times C(12, 0) = 5 \times 1 = 5 \)

Ex #5  You have 7 pieces of fruit: 2 apples, 3 bananas and 2 strawberries. How many fruit combos could you have if you must eat at least one?

\[ C(3, 1) \times C(4, 1) \times C(2, 1) = 3 \times 4 \times 2 = 24 \]

Some Combinations (Identical Items)

At University you must take 5 courses to be full time. You can choose from 5 science, 3 math, 5 business and 4 language courses. How many time tables could you get if:

a) There are no restrictions:

\[ C(17, 5) = 6188 \text{ time tables.} \]

b) Max. 4 business courses:

\[ C(5, 3) \times C(12, 3) = 3360 \]

\[ C(5, 4) \times C(12, 2) = 60 \]

\[ C(5, 5) = 1 \]

\[ \text{OR use INDIRECT METHOD} \]

\[ C(17, 5) - C(5, 3) \times C(12, 3) - C(5, 1) \times C(12, 1) = 6188 - 3360 - 120 = 2628 \]

c) You have AT LEAST 2 science courses:

\[ C(5, 2) \times C(12, 3) = 2200 \]

\[ C(5, 3) \times C(12, 2) = 660 \]

\[ C(5, 4) \times C(12, 1) = 60 \]

\[ C(5, 5) = 1 \]

\[ \text{OR use INDIRECT METHOD} \]

\[ C(17, 5) - C(5, 3) \times C(12, 3) - C(5, 1) \times C(12, 1) = 6188 - 3360 - 120 = 2628 \]

\[ 2628 + 660 + 60 + 1 = 3359 \]

\[ 2628 + 660 + 60 + 1 = 3359 \text{ time tables.} \]
Your Work Today...

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