

6.3 Applying Rules of Sum and Product (5.30)

↳ Rule of Sum Let A, B are finite, disjoint sets.
Then $n(A \cup B) = n(A) + n(B)$

↳ Rule of Product Let A, B are finite sets,
then $n(A \times B) = n(A)n(B)$.

~~Ex Eat at restaurant R_1~~

Ex Deck of standard playing cards

↳ Suit (Ace, Diamond, Clubs, Spades)

↳ Rank/Value (A, 2, 3, ..., 10, J, Q, K)

(,)

↑
Suit

↑
Rank

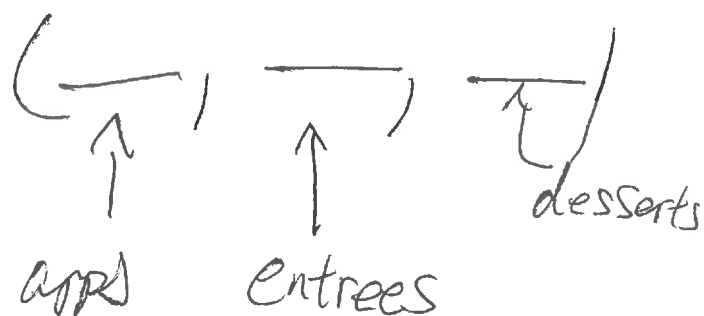
4 \times 13 = 52 playing cards

Ex Restaurant R_1 , set 3-course meal

↳ 5 apps

↳ 34 entrees

↳ 10 desserts

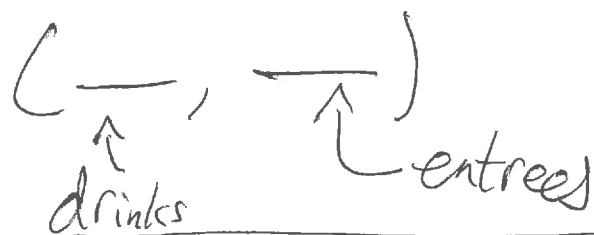


$$\# \text{ 3-course meals} = 5 \times 34 \times 10$$

R_2 , set drink-entree combo

↳ 7 drinks

↳ 12 entrees



$$\# \text{ meals at } R_2 = 7 \times 12$$

$$\text{Total } \# \text{ meals} = \underbrace{(5 \times 34 \times 10)}_{n(R_1)} + \underbrace{(7 \times 12)}_{n(R_2)}$$

Ex Exam broken into two parts: Part A and Part B.

Part A: 10 T/F or 4 MC (but not both)

↳ Each MC has 5 possible answers.

Want # ways to answer Part A

↳ # ways answer 10 T/F: 2^{10}

$$2^{10} = \overbrace{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}^{10 \text{ times}}$$

↳ # ways 4 MC w/ 5 answers per ?

$$5^4 = \overbrace{5 \times 5 \times 5 \times 5}^{4 \text{ times}}$$

ways to answer Part A: $2^{10} + 5^4$

- Part B: 8 T/F or 5 MC (but not both)
↳ Each MC has 4 possible answers

Q How many ways to answer Part B?
 $2^8 + 4^5$

Q If you take both Part A and Part B,
how many ways to answer exam?

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↑ ↑
Part A Part B

$(2^{10} + 5^4) \times (2^8 + 4^5)$