# 6.3 Applications of Rules of Sum and Product

↳ **Rule of Sum** If $A$ and $B$ are disjoint, finite sets, then $n(A \cup B) = n(A) + n(B)$

↳ **Rule of Product** If $A, B$ are finite sets, then $n(A \times B) = n(A) \cdot n(B)$

**Ex** Deck of playing cards with four suits (Ace, Diamond, etc. and 13 ranks/values (Ace, 2, 3, ..., 10, J, Q, K)

Card: $(\_, \_)$ — suit, rank

$4 \times 13 = 52$ possible cards

**Ex** Restaurant $R_1$ has 3-course meal

↳ 5 apps

↳ 34 entrees

↳ 10 desserts

$(\_, \_, \_)$ — app, entree, dess

$5 \times 34 \times 10$ meals

Restaurant $R_2$ 2-course meal

↳ 7 drinks

↳ 12 meals

$(\_, \_)$ — drinks, entrees

$7 \times 12$

• Total # meals: $\underbrace{n(R_1)}_{\uparrow} + \underbrace{n(R_2)}_{\uparrow}$

$= (5 \times 34 \times 10) + (7 \times 12)$

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

# ways to answer Part A:

↳ 10 T/F: $\underline{2}\ \underline{2}\ \underline{2}\ \underline{2}\ \underline{2}\ \underline{2}\ \underline{2}\ \underline{2}\ \underline{2}\ \underline{2}$

$2^{10}$ possible answers

Q List out ways to answering 3 T/F Questions

↳ 4 MC, 5 answers per question

$\underline{5} \times \underline{5} \times \underline{5} \times \underline{5} = 5^4$

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

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

Q # ways to answer part B.

$2^8 + 4^5$

Q Assuming need to do Part A and Part B, determine # ways to answer exam.

$(\_\_\_, \_\_\_)$

↑ Part A ↑ Part B

~~Part A~~

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