7.3 - Basic Counting Principles

Monday, November 6, 2017 12:27 PM

Goals: (1) Solve problems using Venn Diagrams

(2) Multiplication Principle

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(1) Counting using Venn Diagram.

E.g. Survey of 50 students taking 1324.

23 students major in business

16 students major in engineering

7 major in both.

Q: How many students major in neither subject?

How many students major in business alone?

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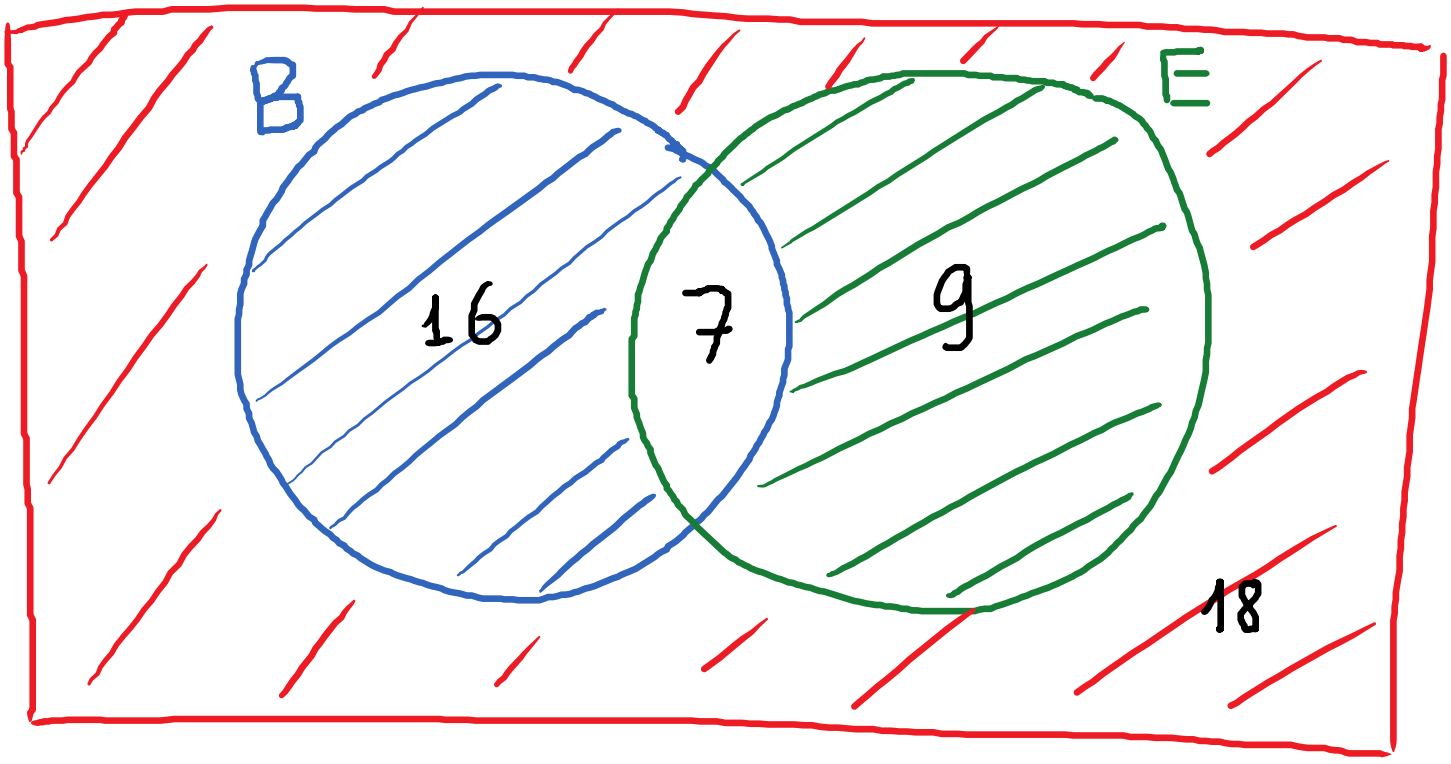
$n(U) = 50$ U



# of students who major in neither subject:

$$50 - (16 + 7 + 9) = 18$$

Use the set above: $B' \cap E'$

$$n(B' \cap E') = 18$$

# of students who major in business alone: 16

$$B \cap E'$$

$$n(B \cap E') = 16$$

E.g. Survey of 100 college students

45 jog, 30 swim, 20 cycle.

6 jog and swim, 1 jog and cycle

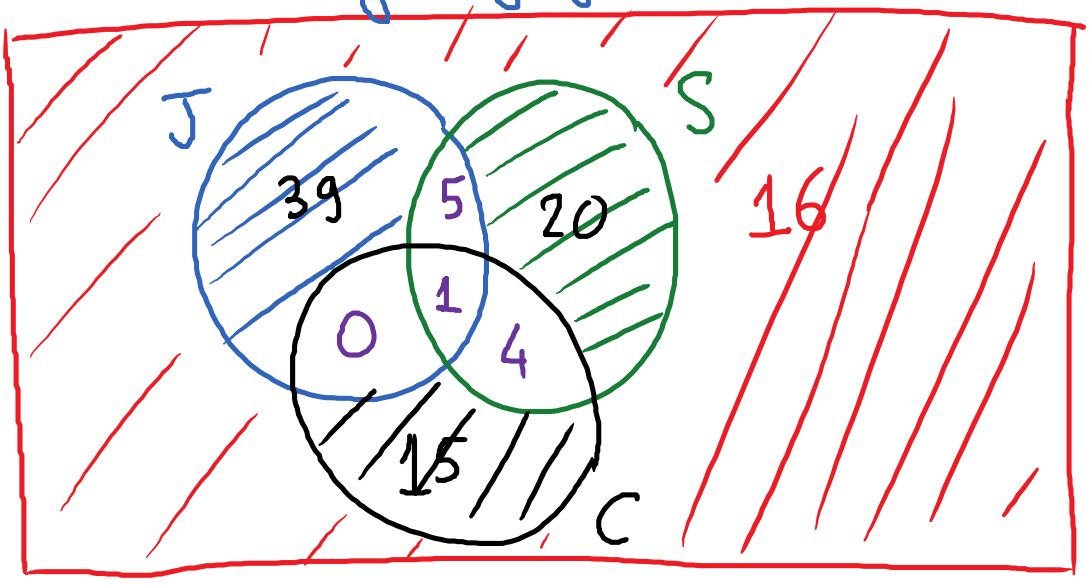
5 swim and cycle, 1 does all three

Q: How many don't exercise? → 16

How many only swim? → 20

How many only cycle? → 15

$n(U) = 100$; U



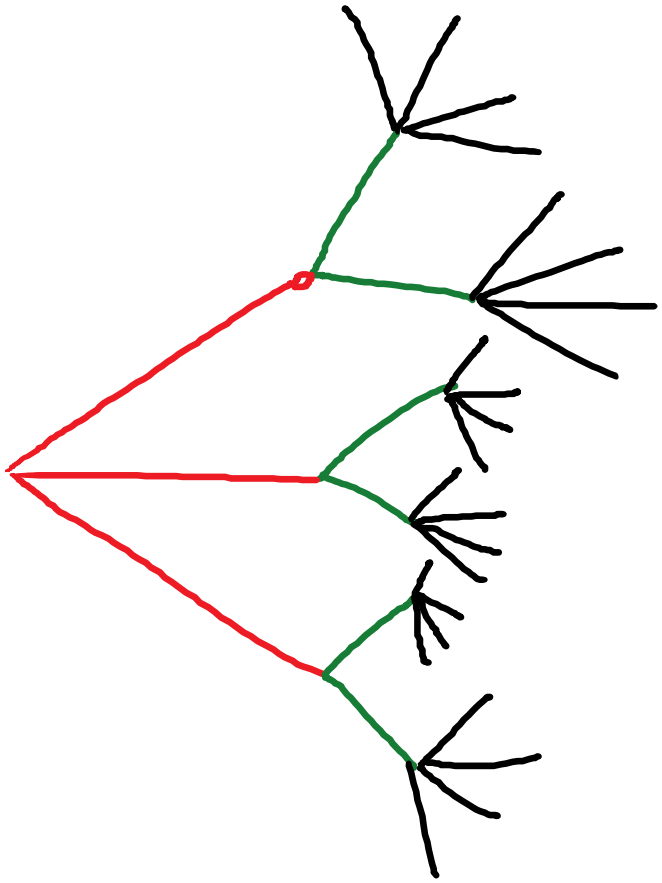
② Multiplication Principle

E.g. You bought 4 different pairs of shoes

3 different shirts

2 different pairs of trousers.

Q: How many different outfits you could have?



# of different outfits

$3 \cdot 2 \cdot 4$

Stage 1 Stage 2 Stage 3

Shirt Trousers Shoes

$= 24$

E.g. Sport team: 28 players.

Q: How many different ways can select a QB, WR, LB.

$28 \cdot 27 \cdot 26 = 19656$

QB WR LB

E.g. Combination lock.

$10 \cdot 10 \cdot 10 = 1000$

10 # for each spot: 0, 1, 2, 3, 4, ..., 9.

What if the digits are allowed to be different

$10 \cdot 9 \cdot 8 = 720$