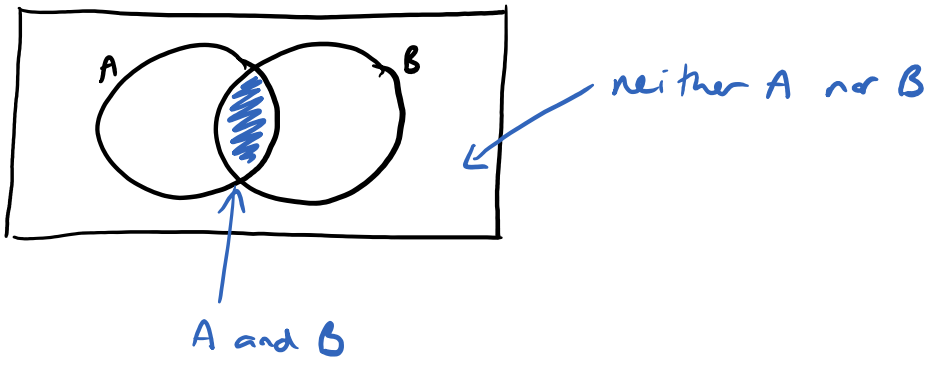
Section 2: cont'd

Thursday, March 16, 2017 1:30 PM

We can present data in a table or diagram.

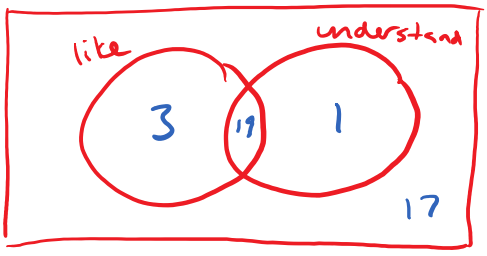
Venn diagram:



handout question (5)

	like	don't like
understand	19	1
don't understand	3	17

a)



b) $P(\text{student likes stats}) = \frac{n(\text{like stats})}{n_{tot}}$

$= \frac{22}{40} = \frac{11}{20}$ or 55%

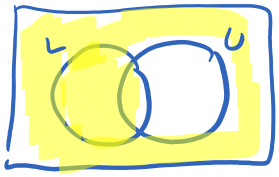
c) $P(\text{likes stats and doesn't understand}) = \frac{n(E)}{n_{tot}}$

$= \frac{3}{40}$

d) $P(\text{likes stats or doesn't understand}) = \frac{n(E)}{n_{TOT}}$

$= \frac{19 + 3 + 17}{40}$

$= \frac{39}{40}$

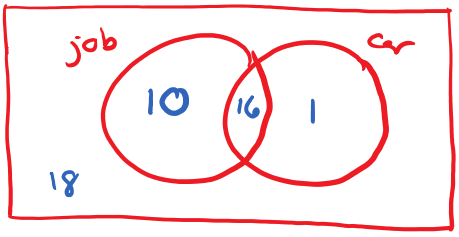


(6) 45 students: 26 have jobs
17 have cars
10 have jobs but no cars

table

	Car	no car	
job	16	10	26
no job	1	18	
	17		45

Venn diagram



a) $P(\text{Car or Job}) = \frac{n(C \text{ or } J)}{n_{tot}} = \frac{27}{45} = \frac{3}{5}$

b) $P(\text{Car and not Job}) = \frac{n(C \text{ and not Job})}{n_{tot}}$

$= \frac{1}{45}$

Three Probability Rules

① $n(A \text{ or } B) = n(A) + n(B) - n(A \text{ and } B)$

number of ways A or B can happen

and there's a related probability rule:

$P(A \text{ or } B) = P(A) + P(B) - P(\text{both } A \text{ and } B)$

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② $n(\text{not } A) = n_{tot} - n(A)$

number of ways A does not happen

$P(\text{not } A) = 1 - P(A)$

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③ multiplication rule: number of outcomes when performing a sequence of experiments

$n = k_1 \cdot k_2 \cdot k_3 \cdot \ldots \; k$

$$n = k_1 \cdot k_2 \cdot k_3 \cdot \ldots \cdot k$$

- n: total number of outcomes
- k_1: number of outcomes for first step
- k: last step

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(8) password: 7 digits chosen from 0, 1, 2, ... 9

a) total number of passwords possible:

$10 \quad 10 \quad 10 \quad 10 \quad 10 \quad 10 \quad 10 \quad = 10^7$

b) end with 3

$10 \quad 10 \quad 10 \quad 10 \quad 10 \quad 10 \quad 1 \quad = 10^6$

↑ this one's a 3

c) don't end with 3

method 1:

$10 \quad 10 \quad 10 \quad 10 \quad 10 \quad 10 \quad 9 \quad = 9 \times 10^6$

method 2:

$$n(\text{don't end 3}) = n_{tot} - n(\text{end in 3})$$
$$= 10^7 - 10^6$$
$$= 9 \times 10^6$$

d) probability that password starts with 4

$$n(\text{start with 4}) = 10^6$$

$$P(\text{start with 4}) = \frac{n(E)}{n_{tot}} = \frac{10^6}{10^7} = \frac{1}{10}$$

e) prob doesn't start with 4

$$P(\text{doesn't start with 4}) = 1 - P(\text{start with 4})$$
$$= 1 - 1/10 = 9/10$$

g) contains at least one 4

$$n(\text{at least one 4}) = n_{tot} - n(\text{no 4s})$$

n(no 4s):

$$\underline{9}\ \underline{9}\ \underline{9}\ \underline{9}\ \underline{9}\ \underline{9}\ \underline{9} = 9^7$$

↑ 9 digits with no 4

$$n(\text{at least one 4}) = 10^7 - 9^7$$

$$P(\text{at least one 4}) = \frac{10^7 - 9^7}{10^7}$$

$$\approx 0.5217 \quad \text{or} \quad 52\%$$