

Hw P.6

1. Students at a small high school in Michigan were asked, "Which subject area do you prefer: Math or English?" For each student, their grade level and response were recorded.

	Freshman	Sophomores	Juniors	Seniors	Total
Math	20	25	34	40	119
English	44	35	31	21	131
Total	64	60	65	61	250

(a) If a student is randomly selected, what is the probability they are a Senior who prefers Math?

$$P(\text{Senior and } m) = \frac{40}{250}$$

	Freshman	Sophomores	Juniors	Seniors	Total
Math	20	25	34	40	119
English	44	35	31	21	131
Total	64	60	65	61	250

(b) If a student who prefers Math is randomly chosen, what is the probability they are a Freshman?

$$P(F \text{ given } m) = \frac{20}{119} \left(= \frac{P(m \text{ and } F)}{P(m)} = \frac{\frac{20}{250}}{\frac{119}{250}} = \frac{20}{119} \right)$$

	Freshman	Sophomores	Juniors	Seniors	Total
Math	20	25	34	40	119
English	44	35	31	21	131
Total	64	60	65	61	250

(c) If a Freshman student is randomly chosen, what is the probability they prefer Math?

$$P(m \text{ given } F) = \frac{20}{64} \left(= \frac{P(m \text{ and } F)}{P(F)} \right)$$

	Freshman	Sophomores	Juniors	Seniors	Total
Math	20	25	34	40	119
English	44	35	31	21	131
Total	64	60	65	61	250

2. Suppose a student from this high school is randomly selected, find the following:

(a) $P(\text{Math and Freshman}) = \frac{20}{250}$

	Freshman	Sophomores	Juniors	Seniors	Total
Math	20	25	34	40	119
English	44	35	31	21	131
Total	64	60	65	61	250

(b) $P(\text{English, given they are a Junior or Senior}) = \frac{31+21}{65+61} = \frac{52}{126}$

	Freshman	Sophomores	Juniors	Seniors	Total
Math	20	25	34	40	119
English	44	35	31	21	131
Total	64	60	65	61	250

(c) $P(\text{Sophomore or Senior}) = P(\text{soph}) + P(\text{Senior}) - P(\text{Soph and Senior})$
 $= \frac{60}{250} + \frac{61}{250} - 0$
 $= \frac{121}{250}$

	Freshman	Sophomores	Juniors	Seniors	Total
Math	20	25	34	40	119
English	44	35	31	21	131
Total	64	60	65	61	250

(d) $P(\text{Sophomore or Math})$

$$= P(\text{soph}) + P(\text{MATH}) - P(\text{Soph AND MATH})$$

$$= \frac{60}{250} + \frac{119}{250} - \frac{25}{250}$$

$$= \frac{154}{250}$$

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