

# HW 6 - Independence HW

Name key

1. A poll was taken of 100 seniors at Riverdale High School and the results are shown in the table. If a student is chosen at random, find the probability that

	Going to college	Not going to college	Totals
Male	40	5	45
Female	40	15	55
totals	80	20	100

a. the student is female  $\frac{55}{100}$

b. the students is female and attending college

$\frac{40}{100}$

\*  $P(\text{college} | \text{female})$

c. that a female student is attending college

$\frac{40}{55}$

d. Are being female and attending college independent events? Show your work.

$P(\text{college} | \text{female}) \stackrel{?}{=} P(\text{college})$

$\frac{40}{55} \stackrel{?}{=} \frac{80}{100}$

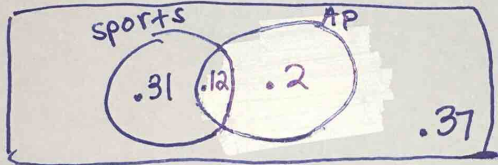
$.727 \neq .8$  not independent

$P(\text{female}) \cdot P(\text{college}) \stackrel{?}{=} P(\text{female and college})$

$\frac{55}{100} \cdot \frac{80}{100} \stackrel{?}{=} \frac{40}{100}$

$.44 \neq .4$  not independent

2. A survey of high school students finds that 43% are involved in school sports, 32% take AP courses, and 12% are involved in sports and take AP courses. If a student is selected at random, find the probability that



a. the student is not involved in sports and is not taking an AP course

$.37$

b. the student is an athlete who doesn't take AP classes

$.31$

c. a student is an athlete and taking an AP class

$.12$

d. given the student is an athlete, he takes an AP class

$\frac{.12}{.43} = .279$

e. Are taking AP classes and playing sports disjoint? Explain.

No because there is overlap

f. Are taking AP courses and playing sports independent? Show your work.

$P(\text{AP} | \text{sports}) \stackrel{?}{=} P(\text{AP})$

$.279 \neq .32$

not independent

$P(\text{AP}) \cdot P(\text{sports}) \stackrel{?}{=} P(\text{AP and sports})$

$.32 \cdot .43 \stackrel{?}{=} .12$

$.1376 \neq .12$

not independent

3. In a sample of 150 residents of FV, each person was asked whether he or she favored the concept of creating a park where the old Crooker Creek golf course was. The table shows the results. Find the probability that a randomly selected person will

Residence	In favor of park	Against the park	total
In FV limits	80	40	120
Outside FV limits	20	10	30
Total	100	50	150

a) favor the park

$$\frac{100}{150}$$

b) favor the park given the person lives in the city limits

$$\frac{80}{120}$$

c) favor the park given the person lives outside the city limits

$$\frac{20}{30}$$

d) Are the events "favor the park" and "live in the city limits" independent. Show your work.

$$P(\text{favor} | \text{in city limits}) \stackrel{?}{=} P(\text{favor})$$

$$\frac{80}{120} \stackrel{?}{=} \frac{100}{150}$$

$$.67 = .67 \checkmark \text{ they are independent}$$

$$P(\text{favor}) \cdot P(\text{in city limits}) \stackrel{?}{=} P(\text{favor and in city limits})$$

$$\frac{100}{150} \cdot \frac{120}{150} \stackrel{?}{=} \frac{80}{150}$$

$$.53 = .53 \checkmark \text{ they are independent}$$

4. Pollsters asked 300 viewers whether they were satisfied with the TV coverage of Hurricane Irma. The table lists the results. If one person is to be selected randomly, find the probability that the person

	Female	Male	
Satisfied	80	55	135
Not satisfied	120	45	165
	200	100	300

a) was satisfied with the coverage

$$\frac{135}{300}$$

b) was a female and was satisfied with the coverage

$$\frac{80}{300}$$

c) was a male who was not satisfied with the coverage

$$P(\text{not satisfied} | \text{male})$$

$$\frac{45}{100}$$

d) Is the event "being satisfied" independent of gender? Show your work.

$$P(\text{not satisfied} | \text{male}) \stackrel{?}{=} P(\text{not satisfied})$$

$$\frac{45}{100} = \frac{165}{300}$$

$$.45 \neq .55 \text{ not independent}$$

$$P(\text{not sat}) \cdot P(\text{male}) \stackrel{?}{=} P(\text{not sat \& male})$$

$$\frac{165}{300} \cdot \frac{100}{300} \stackrel{?}{=} \frac{45}{300}$$

$$.55 \cdot .333 = .183 \neq .15 \text{ not independent}$$

5. One student is selected at random from a group of 200 college students known to consist of 140 full-time students and 60 part-time students. One hundred twenty of the students are female; 80 females attend full-time. Find the probability that the student

	Full Time	Part Time	
Male	60	20	80
Female	80	40	120
	140	60	200

a) is a full-time student

$$\frac{140}{200}$$

b) is male

$$\frac{80}{200}$$

c) is a part-time female student

$$\frac{40}{200}$$

d) is female given that she's part time

$$\frac{40}{60}$$

e) Are the events "attending full time" and "being female" independent? Explain your work.

$$P(\text{full time} | \text{female}) \stackrel{?}{=} P(\text{female})$$

$$\frac{80}{120} \stackrel{?}{=} \frac{120}{200}$$

$$.667 \neq .6 \text{ not independent}$$

$$P(\text{full time}) \cdot P(\text{female}) \stackrel{?}{=} P(\text{full time \& female})$$

$$\frac{140}{200} \cdot \frac{120}{200} \stackrel{?}{=} \frac{80}{200}$$

$$.7 \cdot .6 = .42$$

$$.42 \neq .4 \text{ not independent}$$