

1.) A simple random sample of adults living in a suburb of a large city was selected. The age and annual income of each adult in the sample were recorded. The resulting data are summarized in the table below.

Age Category	Annual Income			Total
	\$25,000-\$35,000	\$35,001-\$50,000	Over \$50,000	
21-30	8	15	27	50
31-45	22	32	35	89
46-60	12	14	27	53
Over 60	5	3	7	15
Total	47	64	96	207

a. What is the probability that a person chosen at random from those in this sample will be in the 31-45 age category?

$$P(31-45) = \frac{89}{207}$$

b. What is the probability that a person chosen at random from those in this sample whose incomes are over \$50,000 will be in the 31-45 age category?

$$P(31-45 | \text{over } 50,000) = \frac{35}{96}$$

c. Based on your answers in parts (a) and (b), is annual income **independent** of age category for those in this sample? **Explain.**

Independent: $P(A) = P(A|B)$

$$P(31-45) = P(31-45 | \text{over } 50,000)$$

$$\frac{89}{207} = \frac{35}{96}$$

$$.43 \neq .36$$

The probabilities are not equal so "age" and "income" are not independent.

2.) A table of the enrollment of students for math classes at SHS is shown below.

	Geometry	Algebra 2	PreCalc	Calculus	TOTAL
10 th Grade	125	74	23	3	225
11 th Grade	41	92	72	25	230
12 th Grade	12	47	99	62	220
TOTAL	178	213	194	90	675

a. What is the probability that a student will take calculus?

$$P(\text{calc}) = \frac{90}{675}$$

b. What is the probability that a 12th grader will take Calculus?

$$P(\text{Calc} | 12^{\text{th}}) = \frac{62}{220}$$

c. What is the probability that a student taking Algebra 2 is a 10th grader?

$$P(10^{\text{th}} | \text{Alg 2}) = \frac{74}{213}$$

d. Are "grade level" and "course enrollment" considered independent events? **Justify your answer.**

$$P(A) = P(A | B)$$

$$P(\text{calc}) = P(\text{calc} | 12^{\text{th}})$$

$$\frac{90}{675} = \frac{62}{220}$$

$$.13 \neq .28$$

The probabilities are not equal

So "grade" and "course"

are not independent.

3.) The school records indicated that 12% of all the students at Pittsford Sutherland High School take AP Statistics. The school records also indicate that 10% of all students at Pittsford Sutherland High School take AP Calculus. If it is given that a student is taking AP Calculus then the probability they are also taking AP Statistics is 20%.

a. State the complement of a student is taking AP Statistics.

$$P(\text{stat}) = .12$$

$$P(\text{stat} | \text{calc}) = .20$$

$$P(\text{calc}) = .10$$

complement
↓

$P(\sim \text{stat}) = .88$

b. Would you consider the two events (AP Statistics , AP Calculus) to be independent?

Explain.

$$P(A) = P(A | B)$$

$$P(\text{stat}) = P(\text{stat} | \text{calc})$$

$$.12 \neq .20$$

The probabilities are not equal so "stat" and "calc" are not independent.