

Companies present their financial information with GAAP.

generally accepted accounting principles

You should solve probability problems with GAPP.

generally accepted probability principles

2/11

3pm

5.5 Probability of an event A

$$P(A) = \frac{n(A)}{n(U)}$$

Complementary events

$$P(A) + P(A') = 1$$

5.6 Combined events

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Mutually exclusive events

$$P(A \cup B) = P(A) + P(B)$$

Conditional probability

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

Independent events

$$P(A \cap B) = P(A)P(B)$$

5.7 Expected value of a discrete random variable X

$$E(X) = \mu = \sum_x x P(X = x)$$

5.8 Binomial distribution

$$X \sim B(n, p) \Rightarrow P(X = r) = \binom{n}{r} p^r (1-p)^{n-r}, \quad r = 0, 1, \dots, n$$

Mean

$$E(X) = np$$

Variance

$$\text{Var}(X) = np(1-p)$$

Today's learning objective:

By the end of class, I will be able to perform GAPP for Venn Diagrams and Tree Diagrams.

Today's language objective:

Given that
Inside out > GAPP
Venn Diagram
Tree Diagram

Given that...

$$P(B) = \frac{10}{23}$$

Given that the student is female,

$$P(B) = \frac{7}{12}$$

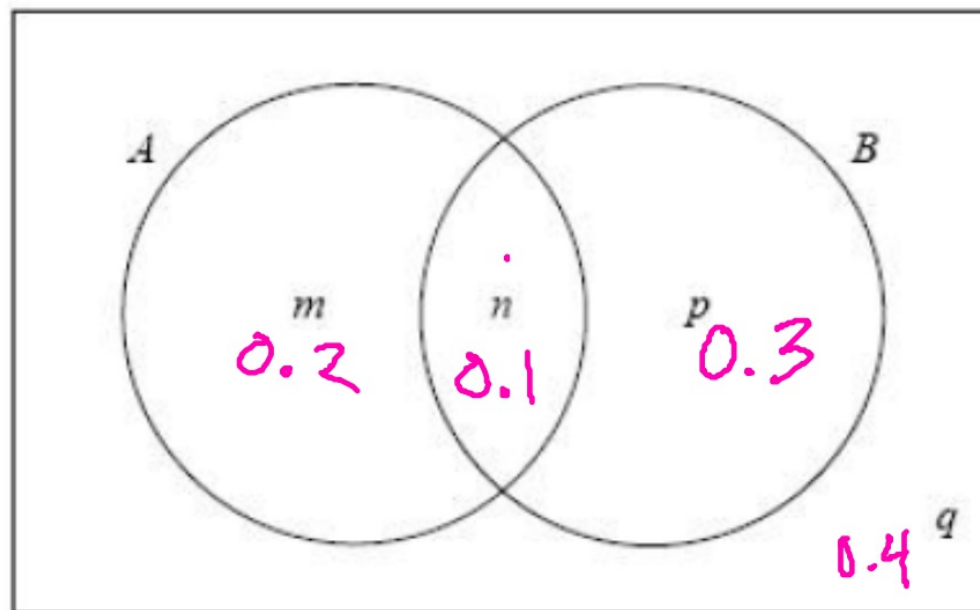
"Given that" ALWAYS changes the denominator & lends focus.

Inside out...

Build Venn Diagrams inside out
(GAPP)

3.) The Venn diagram below shows events A and B where $P(A) = 0.3$, $P(A \cup B) = 0.6$ and $P(A \cap B) = 0.1$. The values m , n , p and q are probabilities.

and



- (a) (i) Write down the value of n .
- (ii) Find the value of m , of p , and of q .

(b) Find $P(B')$.

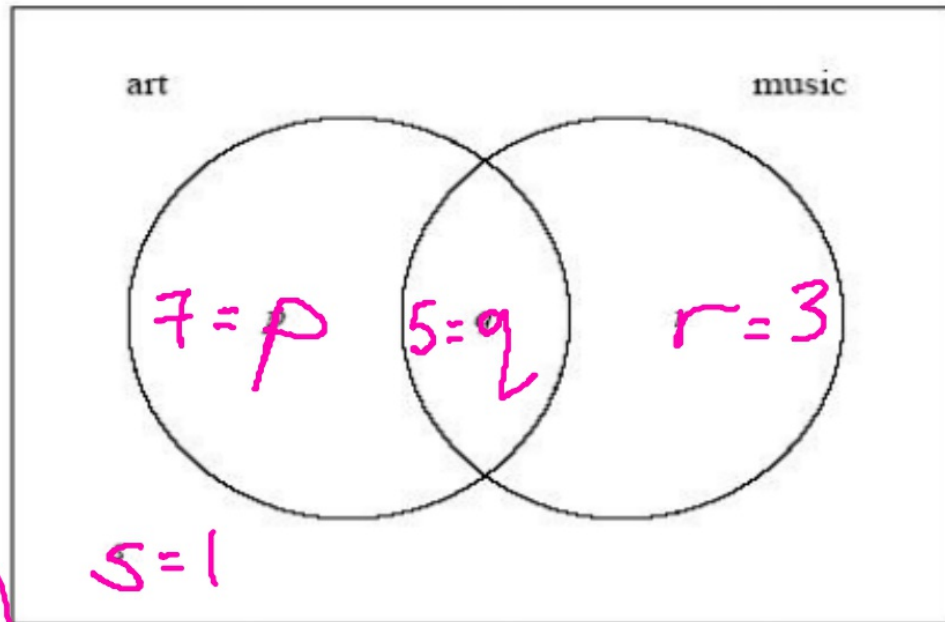
Not B

0.6

(Total 6 m

2.) In a group of 16 students, 12 take art and 8 take music. One student takes neither art nor music. The Venn diagram below shows the events art and music. The values p, q, r and s represent numbers of students.

(Calc)



$$\frac{8}{16} \cdot \frac{12}{16} =$$

$$\frac{1}{2} \cdot \frac{3}{4} =$$

$$\frac{3}{8}$$

(a) (i) Write down the value of s .

(ii) Find the value of q .

(iii) Write down the value of p and of r .

$$\frac{5}{8}$$

(b) (i) A student is selected at random. Given that the student takes music, write down the probability the student takes art.

$$12 + 8 + 1 \neq 16$$

(ii) Hence, show that taking music and taking art are not independent events.

$$\frac{3}{16} \cdot \frac{7}{15} =$$

$$\frac{7}{80}$$

(c) Two students are selected at random, one after the other. Find the probability that the first student takes only music and the second student takes only art.

(5)

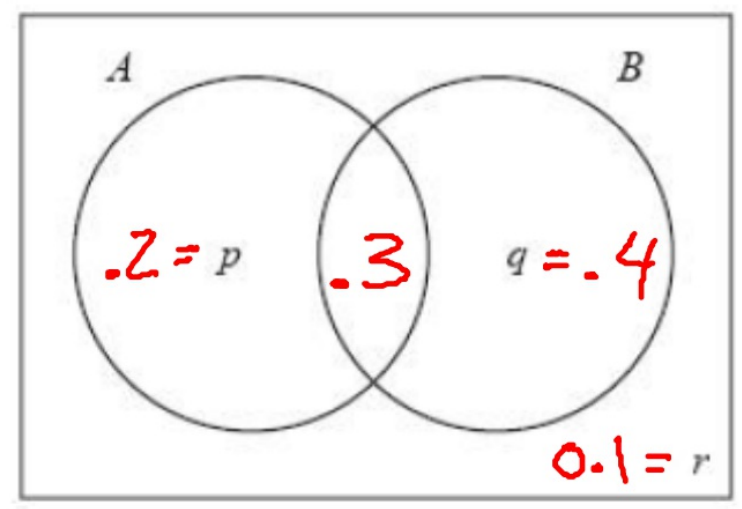
(4)

(4)

9.) Consider the events A and B , where $P(A) = 0.5$, $P(B) = 0.7$ and $P(A \cap B) = 0.3$.

The Venn diagram below shows the events A and B , and the probabilities p , q and r .

Non-calc



$$P(A|B') = \frac{P(B' \cap A)}{P(B')}$$

$$\frac{0.2}{0.1 + 0.2}$$

- (a) Write down the value of
 - (i) p ;
 - (ii) q ;
 - (iii) r .

$$P(A \cap B) = P(A)P(B)$$

$$.35 = (.5)(.7)$$

if indep.

$$P(B' \cap A) = P(B')P(A|B')$$

$$P(A \cap B) = P(A)P(B|A) = \frac{2}{3}$$

- (b) Find the value of $P(A|B')$
- (c) Hence, or otherwise, show that the events A and B are not independent.

$$.35 \neq .3$$

(3)
(2)
(1)
(Total 6 marks)

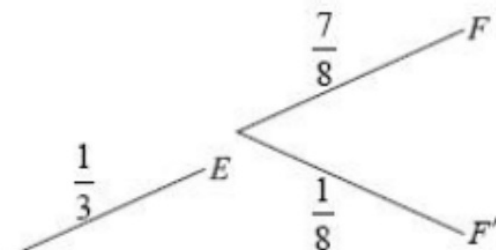
10.) José travels to school on a bus. On any day, the probability that José will miss the bus is $\frac{1}{3}$.

If he misses his bus, the probability that he will be late for school is $\frac{7}{8}$.

If he does not miss his bus, the probability that he will be late is $\frac{3}{8}$.

Let E be the event "he misses his bus" and F the event "he is late for school".
The information above is shown on the following tree diagram.

Calc



$$\frac{1/3}{13/24}$$

The cost for each day that José catches the bus is 3 euros. José goes to school on Monday and Tuesday.

$$\frac{1/3 \cdot 24}{13} = \boxed{\frac{8}{13}}$$

(c) Copy and complete the probability distribution table.

X (cost in euros)	0	3	6
$P(X)$	$\frac{1}{9}$	$\frac{4}{9}$	$\frac{4}{9}$

$$\frac{1}{3} \cdot \frac{7}{8} = \frac{7}{24}$$

$$\frac{7}{24} + \frac{1}{3} \cdot \frac{3}{8} = \frac{13}{24}$$

(d) Find the expected cost for José for both days.

$\boxed{\text{€}4}$

(i) José misses his bus and is not late for school;

(ii) José missed his bus, given that he is late for school.

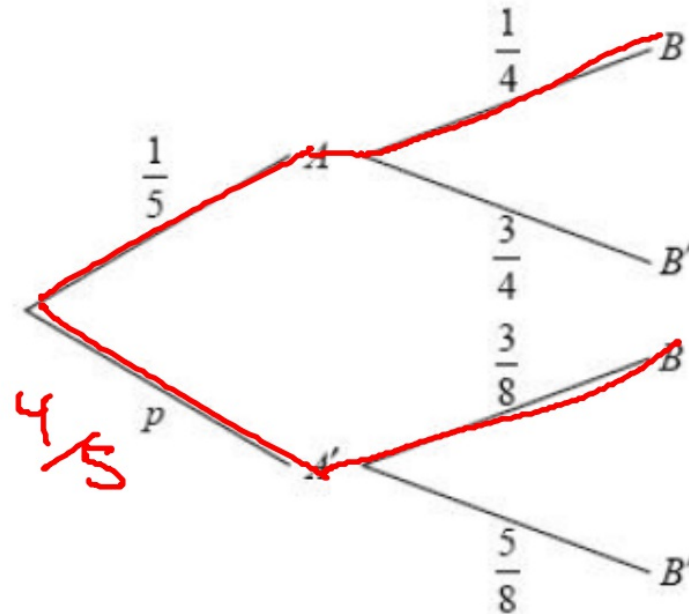
$$\frac{1}{3} \cdot \frac{1}{8} = \frac{1}{24}$$

(Total 14 marks)

14.) The diagram below shows the probabilities for events A and B , with $P(A') = p$.

$$\frac{1}{20} + \frac{12}{40}$$

$$\frac{1}{20} + \frac{6}{20}$$



Non-calc

$$\frac{B \cap A'}{B}$$

$$12/40 = 6/20$$

(a) Write down the value of p . $4/5$

(b) Find $P(B)$. $7/20$

(c) Find $P(A' | B)$. $6/7$

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

$$B \cap A' = B \quad A' | B$$

$$\frac{7}{20}$$

(Total 7 marks)

Romesco hand made pasta

Tofu Ice Cream

Homemade tortilla chips and guacamole

Roti and "butter"

Roasted vegetables with a meyer lemon
vinaigrette

Risotto

Chocolate pan-fried "souffle" with whipped
cream and candied Buddha's hand