What's the probability that class will be an enjoyable experience given that you're in math?

$\overline{\text{Math}}$

If © = 0.4 and ß = 0.65, find the value of Ω if the following statement is true:

$$4©Ω = \frac{ß}{3}$$

Today's learning objective:

By the end of class, I will be able to manipulate probability formulas algebraically to solve problems.

Today's language objective:

You will be able to use the phrase "given that" in context appropriately with a neighbor.

5.5	Probability of an event A	$\mathrm{P}(A) = \dfrac{n(A)}{n(U)}$
	Complementary events	$\mathrm{P}(A) + \mathrm{P}(A') = 1$
5.6	Combined events	$\boxed{\begin{array}{l} \mathrm{P}(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B) - \mathrm{P}(A \cap B) \end{array}}$
	Mutually exclusive events	$\mathrm{P}(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B)$
	Conditional probability	$\mathrm{P}(A \cap B) = \mathrm{P}(A)\,\mathrm{P}(B \mid A)$
	Independent events	$\mathrm{P}(A \cap B) = \mathrm{P}(A)\,\mathrm{P}(B)$
5.7	Expected value of a discrete random variable X	$\mathrm{E}(X) = \mu = \sum_x x\,\mathrm{P}(X = x)$
5.8	Binomial distribution	$X \sim \mathrm{B}(n, p) \;\Rightarrow\; \mathrm{P}(X = r) = \binom{n}{r} p^r (1-p)^{n-r},\; r = 0, 1, \ldots, n$
	Mean	$\mathrm{E}(X) = np$
	Variance	$\mathrm{Var}(X) = np(1-p)$
5.9	Standardized normal variable	$z = \dfrac{x - \mu}{\sigma}$

33.) Let A and B be independent events, where $P(A) = 0.6$ and $P(B) = x$.

(a) Write down an expression for $P(A \cap B)$. $= 0.6x$

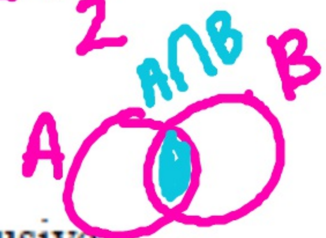
(b) Given that $P(A \cup B) = 0.8$. $= 0.6 + x - 0.6x$

(i) find x;

$0.8 = 0.6 + 0.4x$ $\quad x = \frac{1}{2}$

(ii) find $P(A \cap B)$.

0.3



(c) **Hence**, explain why A and B are **not** mutually exclusive.

Combined events	$P(A \cup B) = P(A) + P(B) - P(A$
~~Mutually exclusive events~~	$\cancel{P(A \cup B) = P(A) + P(B)}$
~~Conditional probability~~	$\cancel{P(A \cap B) = P(A)P(B \mid A)}$
Independent events	$P(A \cap B) = P(A)\,P(B)$

25.) Consider the independent events A and B. Given that $P(B) = 2P(A)$, and $P(A \cup B) = 0.52$, find $P(B)$.

(To

$P(A \cup B) = 0.52 = A + 2A - 2A^2$

$0.52 = 3A - 2A^2$

$P(A \cap B) = P(A) \cdot 2P(A)$

$0 = 3A - 2A^2 - 0.52$

$P(A \cap B) = A \cdot 2A = 2A^2$

$\cancel{x = 1.3}$ $A = x = .2$ $\boxed{B = 0.4}$

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~~	~~$P(A \cap B) = P(A) P(B \mid A)$~~
Independent events	$P(A \cap B) = P(A) P(B)$

44.) Consider the events A and B, where $P(A) = \frac{2}{5}$, $P(B') = \frac{1}{4}$ and $P(A \cup B) = \frac{7}{8}$.

(a) Write down $P(B)$ $= 3/4$

(b) Find $P(A \cap B)$. $7/8 = \frac{2}{5} + \frac{3}{4} - P(A \cap B)$

(c) Find $P(A \mid B)$. $+11/40 = +P(A \cap B)$

$11/40 = 3/4 \cdot P(A|B)$

$11/30 = P(A|B)$

Combined events	$P(A \cup B) = P(A) + P(B) - P($
~~Mutually exclusive events~~	$\cancel{P(A \cup B) = P(A) + P(B)}$
Conditional probability	$P(A \cap B) = P(A)P(B \mid A)$ $P(B) \cdot (A|B)$
~~Independent events~~	$\cancel{P(A \cap B) = P(A)P(B)}$

54.) Let A and B be independent events such that $P(A) = 0.3$ and $P(B) = 0.8$.

(a) Find $P(A \cap B)$. $= 0.24$

(b) Find $P(A \cup B)$. $= 0.86$

(c) Are A and B mutually exclusive? Justify your answer.

$0.3 + 0.8 = 1.1$

$0.3 + 0.8 > 1$

Combined events	$P(A \cup B) = P(A) + P(B) - P($
~~Mutually exclusive events~~	$\cancel{P(A \cup B) = P(A) + P(B)}$
~~Conditional probability~~	$\cancel{P(A \cap B) = P(A)P(B \mid A)}$
Independent events	$P(A \cap B) = P(A)\,P(B)$

61.) Events E and F are independent with $P(E) = \frac{2}{3}$ and $P(E \cap F) = \frac{1}{3}$. Calcul

(a) $P(F)$; $1/2$

(b) $P(E \cup F)$. $5/6$

$\frac{1}{2} + \frac{2}{3} > 1$

Combined events	$P(A \cup B) = P(A) + P(B) - P($
~~Mutually exclusive events~~	$\cancel{P(A \cup B) = P(A) + P(B)}$
~~Conditional probability~~	$\cancel{P(A \cap B) = P(A) P(B \mid A)}$
Independent events	$P(A \cap B) = P(A) P(B)$

The events A and B are independent such that $P(B) = 3P(A)$ and $P(A \cup B) = 0.68$. Find

RTFQ

$\boxed{P(B) = 0.6}$

Combined events	$P(A \cup B) = P(A) + P(B) - P(A$
Mutually exclusive events	$P(A \cup B) = P(A) + P(B)$
~~Conditional probability~~	$\cancel{P(A \cap B) = P(A)P(B \mid A)}$
Independent events	$P(A \cap B) = P(A)\,P(B)$

75.) Let A and B be events such that $\mathrm{P}(A) = \frac{1}{2}$, $\mathrm{P}(B) = \frac{3}{4}$ and $\mathrm{P}(A \cup B) = \frac{7}{8}$.

(a) Calculate $\mathrm{P}(A \cap B)$.

(b) Calculate $\mathrm{P}(A \mid B)$.

(c) Are the events A and B independent? Give a reason for your answer.

Combined events	$\mathrm{P}(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B) - \mathrm{P}(A$
Mutually exclusive events	$\mathrm{P}(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B)$
Conditional probability	$\mathrm{P}(A \cap B) = \mathrm{P}(A)\,\mathrm{P}(B \mid A)$
Independent events	$\mathrm{P}(A \cap B) = \mathrm{P}(A)\,\mathrm{P}(B)$

89.) For events A and B, the probabilities are $P(A) = \frac{3}{11}$, $P(B) = \frac{4}{11}$.

Calculate the value of $P(A \cap B)$ if

(a) $P(A \cup B) = \frac{6}{11}$;

(b) events A and B are independent.

Combined events	$P(A \cup B) = P(A) + P(B) - P$
Mutually exclusive events	$P(A \cup B) = P(A) + P(B)$
Conditional probability	$P(A \cap B) = P(A)P(B \mid A)$
Independent events	$P(A \cap B) = P(A)P(B)$

49.) Two restaurants, *Center* and *New*, sell fish rolls and salads.

Let F be the event a customer chooses a fish roll.

Let S be the event a customer chooses a salad.

Let N be the event a customer chooses neither a fish roll nor a salad.

In the *Center* restaurant $\mathrm{P}(F) = 0.31$, $\mathrm{P}(S) = 0.62$, $\mathrm{P}(N) = 0.14$.

(a) Show that $\mathrm{P}(F \cap S) = 0.07$.

(b) Given that a customer chooses a salad, find the probability the customer also chooses a fish roll.

(c) Are F and S independent events? Justify your answer.

At *New* restaurant, $\mathrm{P}(N) = 0.14$. Twice as many customers choose a salad as choose a fish roll. Choosing a fish roll is **independent** of choosing a salad.

(d) Find the probability that a fish roll is chosen.