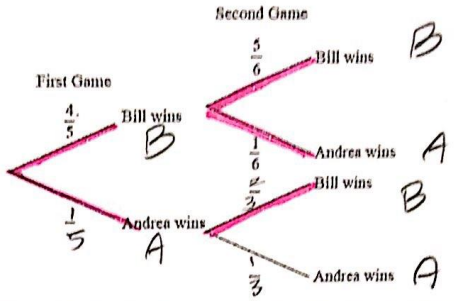
SL 1 PROBABILITY REVIEW #1

NAME _____ HR: ____

ONE: NON CALCULATOR (a)-(c) FOUNDATIONAL, (d) MODERATE

Bill and Andrea play two games of tennis. The probability that Bill wins the first game is $\frac{4}{5}$.
If Bill wins the first game, the probability that he wins the second game is $\frac{5}{6}$.
If Bill loses the first game, the probability that he wins the second game is $\frac{2}{3}$.

(a) complete the following tree diagram.



(b) Find the probability that Bill wins the first game and Andrea wins the second game. $P(B \cap A) = \frac{4}{5} \cdot \frac{1}{6} = \frac{4}{30}$

(c) Find the probability that Bill wins at least one game. $1.0 - P(A \cap A) = 1 - \frac{1}{15} = \frac{14}{15}$

(d) Given that Bill wins at least one game, find the probability that he wins both games.

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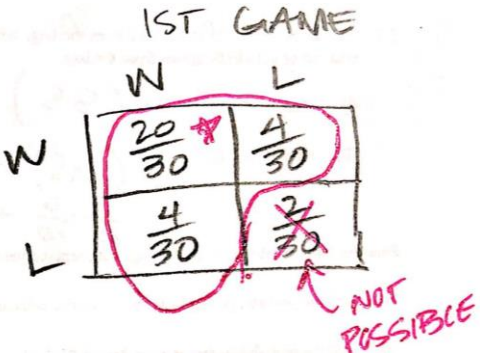
$$\frac{\frac{20}{30}}{\frac{20}{30} + \frac{4}{30} + \frac{4}{30}} = \frac{20}{28}$$

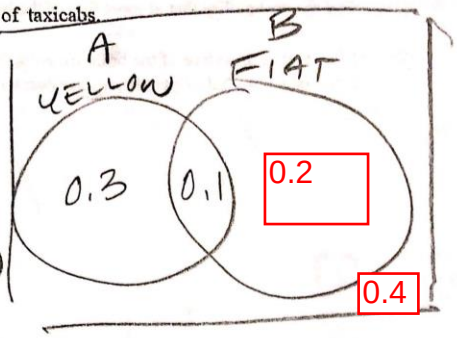


TWO: NON CALCULATOR FOUNDATIONAL

Celeste wishes to hire a taxicab from a company which has a large number of taxicabs.
The taxicabs are randomly assigned by the company.

The probability that a taxicab is yellow is 0.4.
The probability that a taxicab is a Fiat is 0.3.
The probability that a taxicab is yellow or a Fiat is 0.6.

Find the probability that the taxicab hired by Celeste is **not** a yellow Fiat.



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

$0.6 = 0.4 + 0.3 - P(A \cap B)$

(0.1)

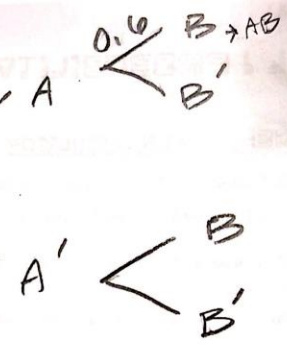
$P(A \cap B)' = 90\%$

THREE: **NON CALCULATOR** FOUNDATIONAL

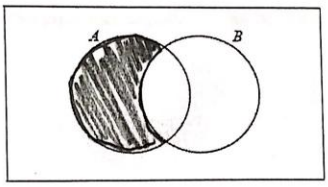
Let A and B be independent events, where $P(A) = 0.3$ and $P(B) = 0.6$.

(a) Find $P(A \cap B)$. $P(A) \cdot P(B) = 0.18$

(b) Find $P(A \cup B)$. $P(A) + P(B) - P(A \cap B) = 0.72$



(c) (i) On the following Venn diagram, shade the region that represents $A \cap B'$.



(ii) Find $P(A \cap B')$.

$P(A) - P(A \cap B) = 0.3 - 0.18 = 0.12 = 12\%$

FOUR: **WITH CALCULATOR** (a)-(b) FOUNDATIONAL, (c)-(d) MODERATE

A bag contains four gold balls and six silver balls.

(a) Two balls are drawn at random from the bag, with replacement. Let X be the number of gold balls drawn from the bag.

(i) Find $P(X = 0)$. $P(SS) = \frac{6}{10} \cdot \frac{6}{10} = 36\%$

(ii) Find $P(X = 1)$. $P(GS) + P(SG)$

$\frac{4}{10} \cdot \frac{6}{10} + \frac{6}{10} \cdot \frac{4}{10} = 48\%$

(a) Fourteen balls are drawn from the bag, with replacement.

(b) Find the probability that exactly five of the balls are gold.

$2002\left(\frac{4}{10}\right)^5\left(\frac{6}{10}\right)^9 = 20.669\%$

(c) Find the probability that at most five of the balls are gold.

(d) Given that at most five of the balls are gold, find the probability that exactly five of the balls are gold. Give the answer correct to two decimal places.

$\frac{20.66}{48.5} \approx 42.60\%$

$P(5G, 4G, 3G, 2G, 1G, 0G, 13, 14G)$

$$= \begin{cases} 2002\left(\frac{4}{10}\right)^5\left(\frac{6}{10}\right)^9 = 20.669\% \\ 1001\left(\frac{4}{10}\right)^4\left(\frac{6}{10}\right)^{10} = 15.499\% \\ 364\left(\frac{4}{10}\right)^3\left(\frac{6}{10}\right)^{11} = 8.459\% \\ 91\left(\frac{4}{10}\right)^2\left(\frac{6}{10}\right)^{12} = 3.179\% \\ 14\left(\frac{4}{10}\right)^1\left(\frac{6}{10}\right)^{13} = 0.739\% \\ 1\left(\frac{6}{10}\right)^{10}\left(\frac{4}{10}\right)^{14} = 0.0007\% \end{cases} = 48.59\%$$

https://goo.gl/4wyUaz

WAYS TO REARRANGE...

0G 1G 2G 3G 4G 5G

$P(\text{AT MOST 5 ARE GOLD})$

						1								
					1		1							
				1		2		1						
			1		3		3		1					
		1		4		6		4		1				
	1		5		10		10		5		1			
1		6		15		20		15		6		1		
	7		21		35		35		21		7		1	
1		8		28		56		70		56		28		8		1
	9		36		84		126		126		84		36		9		1
1		10		45		120		210		252		210		120		45		10		1
	11		55		165		330		462		462		330		165		55		11		1
1		12		66		220		495		792		924		792		495		220		66		12		1
	13		78		286		715		1287		1716		1716		1287		715		286		78		13	
1		14		91		364		1001		2002		3003		3432		3003		2002		1001		364		91		14		1
	15		105		455		1365		3003		5005		6435		6435		5005		3003		1365		455		105		15	
1		16		120		560		1820		4368		8008		11440		12870		11440		8008		4368		1820		560		120		16		1
	17		136		680		2380		6188		12376		19448		24310		24310		19448		12376		6188		2380		680		136		17	
1		18		153		816		3060		8568		18564		31824		43758		48620		43758		31824		18564		8568		3060		816		153		18		1
	19		171		969		3876		11628		27132		50388		75582		92378		92378		75582		50388		27132		11628		3876		969		171		19	
1		20		190		1140		4845		15504		38760		77520		125970		167960		184756		167960		125970		77520		38760		15504		4845		1140		190		20		1

2002 WAYS TO REARRANGE 5 GOLD WITH 14 PICKS

$A = P(\text{GOLD}) = \frac{4}{10}$

$B = P(\text{NOT GOLD}) = \frac{6}{10}$