Unit 6 Probability Study guide

Notation:		
Or = $P(A \cup B)$	And = $P(A \cap B)$	Given = $P(A \mid B)$
Formulas		
$P(A \cup B) = P(A) + P(B) - P(A \text{ and } B)$	$P(A \cap B) = P(A) \cdot P(B)$	$P(A \mid B) = \frac{P(A \text{ and } B)}{P(B)}$ $P(B \mid A) = \frac{P(A \text{ and } B)}{P(A)}$

1. Below are the counts (in thousands) of earned degrees in the United States in a recent year, classified by level and by the sex of the degree recipient. One person is selected at random, find the following probabilities.

	Bachelor's (B)	Master's (MA)	Professional (P)	Doctorate (D)	Total
Female (F)	616	194	30	16	856
Male (M)	529	171	44	26	770
Total	1145	365	74	42	1626

a) $P(F) = \frac{856}{1626} \rightarrow .53$

b) $P(M) = \frac{770}{1626} \rightarrow .47$

c) $P(F \cap D) = \frac{16}{1626} \rightarrow .01$

d) $P(M \cap B) = \frac{529}{1626} \rightarrow .33$

e) $P(M \cup P) = \frac{770}{1626} + \frac{74}{1626} - \frac{44}{1626} \rightarrow .49$

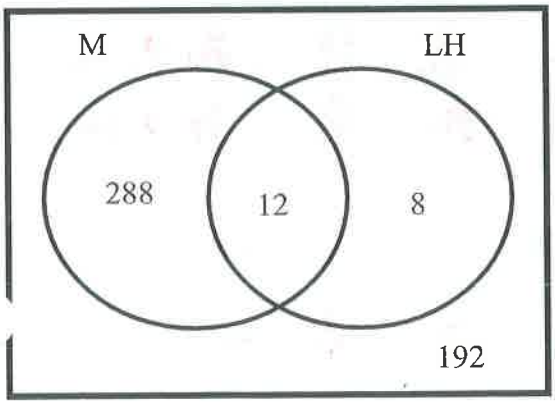
f) $P(F \cup B) = \frac{1385}{1626} \rightarrow .85$
$856 + 1145 - 616$

g) $P(M \cup F) = \frac{1626}{1626} \rightarrow 1$
$770 + 856 - 0$

h) $P(F \mid D) = \frac{16}{42} \rightarrow .38$

i) $P(MA \mid M) = \frac{171}{770} \rightarrow .22$

2. Of 500 athletes surveyed, 300 were male and 20 were left-handed. Only 8 of the left-handed athletes were female.



a) $P(M) = \frac{300}{500} \rightarrow .6$

b) $P(LH) = \frac{20}{500} \rightarrow .04$

c) $P(M \cap LH) = \frac{12}{500} \rightarrow .02$

d) $P(M \cup LH) = \frac{308}{500} \rightarrow .62$

e) $P(M \cup H)' = \frac{192}{500} \rightarrow .38$

f) $P(M' \cap LH') = \frac{192}{500} \rightarrow .38$

g) $P(M \cap LH)' = \frac{488}{500} \rightarrow .98$

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9. A six-sided cube is rolled twice. What is probability that you will roll a sum greater than 9?

$\frac{6}{36} \rightarrow .17 \rightarrow 17\%$

+	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

10. Determine if Independent or Dependent.

Independent: $P(A \cap B) = P(A) \cdot P(B)$	Dependent: $P(A \cap B) \neq P(A) \cdot P(B)$

a) $P(A \cap B) = 0.75,\ P(A) = 0.45,\ P(B) = 0.30$

$.75 = .45 \cdot .30 \rightarrow .75 \neq .135$

Conclusion: These events are dependent

b) $P(A \cap B) = 0.0672,\ P(A) = 0.12,\ P(B) = 0.56$

$.0672 = .12 \cdot .56 \rightarrow .0672 = .0672$

Conclusion: These events are Independent

11. Given the frequency table below, determine the following.

	Male	Female	Total
Born in GA	7	5	12
Not Born in GA	16	13	29
Total	23	18	41

a) P(Female) = $\frac{18}{41} \rightarrow .44$

b) P(Born in GA) = $\frac{12}{41} \rightarrow .29$

c) P(Female ∩ Born in GA) = $\frac{5}{41} \rightarrow .12$

d) P(Female | Born in GA) = $\frac{5}{12} \rightarrow .42$

e) P(Born in GA | Female) = $\frac{5}{18} \rightarrow .28$

f) Are the events Female and Born in GA independent? Explain.

$P(f) \cdot P(GA) = P(f \cap GA)$

$\frac{18}{41} \cdot \frac{12}{41} = \frac{5}{41}$

$.123 = .121$

No equation doesn't work

12. One card is selected at random from the following set of 6 cards, each of which has a number and a black or white symbol. Let W be the event that the selected card has a white symbol, and F be the event that the selected card has a 5.

{2△, 4□, 8■, 8◆, 5□, 5■ }

Determine if the events W and F are independent or dependent. Justify your answer.

$P(\text{White} \cap 5) = P(W) \cdot P(F)$

$\frac{1}{6} = \frac{3}{6} \cdot \frac{2}{6} \rightarrow \frac{1}{6} = \frac{1}{6}$

Events W and E are Independent.