

STAT100 Elementary Statistics and Probability Summer II 2014

Quiz 3, Tuesday, July 22, 2014

Name: Jeff

Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible. You are allowed to calculator for basic calculation in this quiz. You have 15 minutes to take this 10 point quiz.

1. (5 points) Determine the missing entries of the table, and find the following probabilities.

	A	\bar{A}	
B	.15	.35	.5
\bar{B}	.15	.35	.5
	.3	.7	1

(a). $P(A\bar{B}) = .15$

(b). $P(B|A) = \frac{P(AB)}{P(A)} = \frac{.15}{.3} = .5$

(c). Are A and B disjoint? Explain Why.

No, As $P(AB) = .15 \neq 0$.

(d). Are A and B independent? Explain Why.

Yes. As $P(B|A) = P(B) = .5$ (Or $P(AB) = P(A)P(B)$
 $.15 = .3 \times .5$)

2. (5 points) Carol and Karl both solve difficult computer problems that come to the student desk. Carol makes 60% of the repairs and Karl 40%. However, Carol's repair are incomplete 4% of the time and Karl's are incomplete 6% of the time.

Hint: Let $A = \{a \text{ repair is incomplete}\}$, $B = \{\text{Carol's repair}\}$. Clearly, $\bar{B} = \{\text{Karl's repair}\}$. Use the rule of total probability to solve part (a), and Bayes' theorem to solve part (b).

(a). Determine the probability that a repair is incomplete.

$P(B) = .6$, $P(\bar{B}) = .4$, $P(A|B) = .04$, $P(A|\bar{B}) = .06$

Therefore

$P(A) = P(A|B)P(B) + P(A|\bar{B})P(\bar{B}) = .04 \times .6 + .06 \times .4 = .048$

(b). If a repair is found to be incomplete, what is the probability that the repair was made by Karl?

$P(\bar{B}|A) = \frac{P(A|\bar{B})P(\bar{B})}{P(A|B)P(B) + P(A|\bar{B})P(\bar{B})} = \frac{.06 \times .4}{.048} = .5$