Key Sol.

BIRZEIT UNIVERSITY

Faculty of Engineering and Technology
Electrical and Computer Engineering Department
Probability and Statistical Engineering, ENEE2307
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Quiz#1

Date: Time: 25 minutes
Name: Student #:

Problem 1 (10 pts)**:**
Suppose we roll two dice; a red dice and a blue dice. The red dice is fair. However, the probability of observing an even number is double the probability of observing an odd number in the blue dice. Let A = "The numbers observed on both dice are the same". Compute P(A).

* For the red dice
$p(\{1\}) = p(\{2\}) = p(\{3\}) = p(\{4\}) = p(\{5\}) = p(\{6\}) = \frac{1}{6}$

* For the blue dice
$p(\{1\}) = p(\{3\}) = p(\{5\}) = K$, $p(\{2\}) = p(\{4\}) = p(\{6\}) = 2K$
so $p(\{1,2,3,4,5,6\}) = K + 2K + K + 2K + K + 2K = 9K = 1$
$K = \frac{1}{9}$

* $A = \{(1,1), (2,2), (3,3), (4,4), (5,5), (6,6)\}$.
(1,1): red, blue

$p(\{(1,1)\}) = p(\{1\})\,p(\{1\}) = \frac{1}{6} * \frac{1}{9} = \frac{1}{54} = p(\{(3,3)\}) = p(\{(5,5)\})$
(r, b; r, b)

$p(\{2,4\}) = p(\{2\})\,p(\{2\}) = \frac{1}{6} * \frac{2}{9} = \frac{2}{54} = p(\{4,4\}) + p(\{6,6\})$
(r, b)

so $p(A) = 3 * \frac{1}{54} + 3 * \frac{2}{54} = \frac{9}{54} = \frac{1}{6}$

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Problem 2 (5+5 pts):

Students travel to Birzeit University by either taxi or busses. The probability that a student who travels by taxi arrives late is 4%. And the probability that a student who travels by a bus arrives late is 10%. From previous experience, the probability students arrive late to university is 6%. Determine the following:

a) The probability a student travels to university by busses?

$P(T)+P(B)=1 \rightarrow P(T)=1-P(B)$

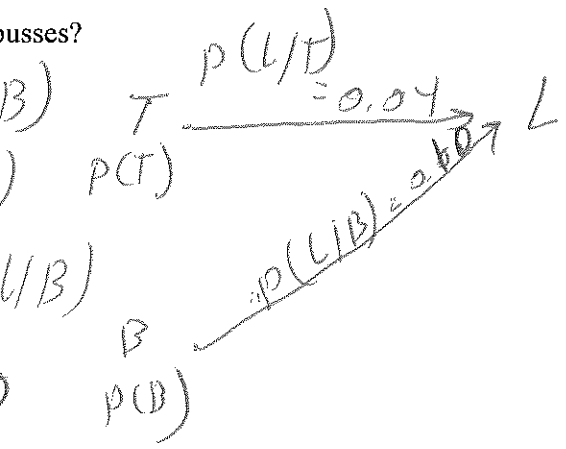
$P(L)=P(T)P(L/T)+P(B)P(L/B)$

$P(L)=[1-P(B)]P(L/T)+P(B)P(L/B)$

$0.06=[1-P(B)]0.04+P(B)0.10$

$0.06=0.04-0.04P(B)+0.10P(B)$

$0.02=0.06P(B) \rightarrow P(B)=\frac{0.02}{0.06}=\frac{1}{3}$



b) If a student is late, what is the probability that the student traveled through Busses?

$$P(B/L)=\frac{P(L/B)P(B)}{P(L)}$$

$$=\frac{0.1*\frac{1}{3}}{0.06}=\frac{10}{18}=\frac{5}{9}$$

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