AI1103 - Assignment 3

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QUESTION:

If A and B are two events and the probability $\Pr(B) \neq 1$, then $\dfrac{\Pr(A) - \Pr(AB)}{1 - \Pr(B)}$ equals

1) $\Pr\left(\dfrac{A}{\bar{B}}\right)$

2) $\Pr\left(\dfrac{A}{B}\right)$

3) $\Pr\left(\dfrac{\bar{A}}{B}\right)$

4) $\Pr\left(\dfrac{\bar{A}}{\bar{B}}\right)$

ANSWER:

From Laws of complimentary of Boolean algebra

$$B + \bar{B} = 1 \qquad (0.0.1)$$

$$\Pr(B) + \Pr(\bar{B}) = 1 \qquad (0.0.2)$$

$$1 - \Pr(B) = \Pr(\bar{B}) \qquad (0.0.3)$$

And also as

$$A - AB = A(1 - B) \qquad (0.0.4)$$

$$A - AB = A(\bar{B}) \qquad (0.0.5)$$

$$\Pr(A) - \Pr(AB) = \Pr(A\bar{B}) \qquad (0.0.6)$$

Truth table					
A	B	AB	$\bar{B}$	A-AB	$A\bar{B}$
1	1	1	0	0	0
1	0	0	1	1	1
0	1	0	0	0	0
0	0	0	1	0	0

Using the above equations (0.0.3) and (0.0.6)

$$\frac{\Pr(A) - \Pr(AB)}{1 - \Pr(B)} = \frac{\Pr(A\bar{B})}{\Pr(\bar{B})} \qquad (0.0.7)$$

$$= \Pr(A/\bar{B}) \qquad (0.0.8)$$

Hence, option (1) is correct.