Question 12.13.3.104
Probability and Random Processes

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Question:12/13/3/104
If A and B are two events such that $\Pr(A|B) = p, \Pr(A) = p, \Pr(B) = \frac{1}{3}$ and $\Pr(A+B) = \frac{5}{9}$,then $p =$
Solution:

$$\Pr(A|B) = p \tag{1}$$
$$\frac{\Pr(AB)}{\Pr(B)} = p \tag{2}$$
$$\Pr(AB) = p\Pr(B) \tag{3}$$
$$= \frac{p}{3} \tag{4}$$

$$\Pr(A+B) = \frac{5}{9} \tag{5}$$
$$\Pr(A) + \Pr(B) - \Pr(AB) = \frac{5}{9} \tag{6}$$
$$p + \frac{1}{3} - \frac{p}{3} = \frac{5}{9} \tag{7}$$
$$\frac{2p}{3} = \frac{2}{9} \tag{8}$$
$$p = \frac{1}{3} \tag{9}$$