MATH 10B with Prof. Stankova
Section #209 ; time: 3:30-5pm
GSI: Ninh DO

Quiz 6 Solution

Student:
SID:
Tue 3/5/19

True/False - No explanation needed. (1pt for correct, 0pt - no answer, -1pt - incorrect)

1. It is sufficient to conclude that the event A is independent from the event B if $P(B) = P(B|A)$. True/False
   True. This is one definition of independence.

2. The fact $P(A|B) = 0$ is a special case implying that the event A is independent from the event B. True/False
   False. If A and B are mutually exclusive, $P(A|B) = 0$ (think of a Venn diagram with two separate circles), but $P(A) \neq 0$, so $P(A|B) \neq P(A)$. Thus, A and B are not independent.

Problems - Need justification. No justification means **zero**!

1. (10pts) Suppose a weatherman predicts rainy days correctly with an accuracy of 80% and predicts clear days correctly with an accuracy of 70%. Given that it rains 10% of the time, and the weatherman predicted that it will not rain tomorrow, what is the probability that it will actually not rain tomorrow?

   A: raining, B: predicting rainy
   Given: $P(B|A) = 0.8, P(\bar{B}|\bar{A}) = 0.7, P(A) = 0.1$
   Calculate:

$$P(\bar{A}|\bar{B}) = \frac{1}{1 + \frac{P(\bar{B}|A)*P(A)}{P(\bar{B}|\bar{A})*P(\bar{A})}} = \frac{1}{1 + \frac{0.2*0.1}{0.7*0.9}} = 0.969$$

   or

$$P(\bar{A}|\bar{B}) = \frac{P(\bar{B}|\bar{A}) * P(\bar{A})}{P(\bar{B}|A) * P(A) + P(\bar{B}|\bar{A}) * P(\bar{A})} = \frac{0.7 * 0.9}{0.2 * 0.1 + 0.7 * 0.9} = 0.969$$