

1. For events A, B prove:

$$P(A|B) = \frac{P(B|A)P(A)}{P(B|A)P(A) + P(B|\neg A)P(\neg A)}$$

( $\neg A$  denote the event that A does not occur.)

2. Let X, Y, and Z be random variables taking values in  $\{0, 1\}$ . The following table lists the probability of each possible assignment of 0 and 1 to the variables X, Y, and Z:

	Z=0		Z=1	
	X=0	X=1	X=0	X=1
Y=0	0.1	0.05	0.1	0.1
Y=1	0.2	0.1	0.175	0.175

- (a) Is X independent of Y? Why or why not?
- (b) Is X conditionally independent of Y given Z? Why or why not?
- (c) Calculate  $P(X \neq Y|Z = 0)$ .