ISTA 116: WEB QUIZ 6 (6 PTS)

(1) Suppose E_1 and E_2 are disjoint events, with $P(E_1) = 0.5$ and $P(E_2) = 0.2$. What is $P_{E_1}(E_2)$?

(a): 0.00

(b): 0.10

(c): 0.20

(c): 0.40

(d): 0.50

(e): 0.70

(f): There is not enough information.

(2) For two events E_1 and E_2 (not necessarily disjoint this time), which of the following characterizes the relationship between $P_{E_1}(E_2)$ and $P_{E_2}(E_1)$?

(a): They are always equal.

(b): They are equal if E_1 and E_2 are independent.

(c): They are equal if $P(E_1) = P(E_2)$, but $P_{E_1}(E_2)$ is greater than $P_{E_2}(E_1)$ if $P(E_1) > P(E_2)$.

(d): They are equal if $P(E_1) = P(E_2)$, but $P_{E_1}(E_2)$ is greater than $P_{E_2}(E_1)$ if $P(E_2) > P(E_1)$.

(e): They are equal if $P(E_1) = P(E_2)$, but otherwise it depends on the context.

(f): We can't say anything about the relationship without knowing the context.

Date: Due 7 November 2011.

Questions 3-6 refer to the following scenario:

A store manager reads that about 1 in 10 employees steal small amounts of cash during work. When the books don't balance one month, she decides to investigate with a lie detector (this may well be illegal, but let's roll with it for the sake of the example). The lie detector is supposedly 80% accurate in both directions (i.e., 80% of true statements pass without setting it off, and 80% of false statements do set it off). Supposing the above probabilities are correct, what is:

(3) the (joint) probability that a given employee *both* stole *and* sets off the machine?

(a): 0.080

(b): 0.100

(c): 0.125

(d): 0.700

(e): 0.800

(4) the (joint) probability that a given employee did not steal but sets off the machine anyway?

(a): 0.100

(b): 0.180

(c): 0.200

(d): 0.720

(e): 0.800

(5) the *marginal* probability that an employee sets off the lie detector?

(a): 0.200

(b): 0.260

(c): 0.500

(d): 0.720

(e): 0.800

(6) the *conditional* probability that an employee stole, *given* that s/he has set off the lie detector?

(a): 0.100

(b): 0.308

(c): 0.385

(d): 0.800

(e): 0.900