M118 SECTION 8.4 – BAYES' FORMULA

1) In Section 8.3, we found the probability of A given B already happened – now we are going to find the probbaility of an earlier event given the occurrence of a later event.

Ex: Urn 1 has 4 black and 1 white ball. Urn 2 has 2 black and 2 white. A single die is rolled and if a 1 or 3 turns up, a ball is drawn from Urn 1 otherwise a ball is drawn from Urn 2. If the ball is black, what is the probability that it came from

a) Urn1

b) Urn2

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Urn 1 contains 7 red and 3 white balls. Urn 2 contains 4 red and 5 white balls. A ball is drawn from Urn 1 and placed into Urn 2. Then a ball is drawn from Urn 2.

a) If the ball drawn from Urn 2 is red, what is the probability that the ball drawn from Urn 1 was red? _____

b) If the ball drawn from Urn 2 is white, what is the probability that the ball drawn from Urn 1 was white? _____

Ex: A test for tuberculosis was given to 1,000 subjects, 8% of whom were known to have tuberculosis. For the subjects who had tuberculosis, the test indicated tuberculosis in 90% of the subjects, was inconclusive for 7%, and indicated no tuberculosis in 3%. For the subjects who did not have tuberculosis, the test indicated tuberculosis in5% of the subjects, was inconclusive for 10%, and indicated no tuberculosis in the remaining 85%. What is the probability

a) of a randomly selected person having tuberculosis given that the test indicates tuberculosis? _____

b) of not having tuberculosis given that the test was inconclusive?

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