ASE2030 Linear Algebra and Statistics: Homework #6

1) A missile can be accidentally launched if two relays A and B both have failed. The probability of A and B failing are known to be 0.01 and 0.03, respectively. It is also known that B is likely to fail with probability of 0.06 if A has failed.

   a) What is the probability of an accidental launch?

   b) What is the probability that A will fail if B has failed?

   c) Are the events "A fails" and "B fails" statistically independent?

2) A manufacturing plant makes radios that each contain an integrated circuit (IC) supplied by three sources A, B, and C. The probability that the IC in a radio came from one of the sources is 1/3, the same for all sources. The ICs are known to be defective with probabilities 0.001, 0.003, and 0.002 for sources A, B, and C, respectively.

   a) What is the probability any given radio will contain a defective IC?

   b) If a radio contains a defective IC, find the probability it came from source A. Repeat for source B and C.

3) Determine the real constant a, for arbitrary real constants m and $b > 0$, such that

$$f_X(x) = ae^{-|x-m|/b}$$

   is a valid probability density function (This is called the *Laplace distribution*).