

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*). With the constant a you just found, find the cumulative distribution function, $F_X(s)$, for the Laplace distribution.