
 57:022 Principles of Design II - Quiz #7 Solutions
 Spring 2002

Five components (A,B,C,D, & E) are available for constructing a system. The probability that each component *survives* the first year of operation is

- 70% for A, B, & C
- 80% for D & E.

For each system (1) through (5) below:

For each of these three scenarios (a,b,c), indicate whether the system will Fail or Survive (*write "F" or "S" in the table*):

- (i) only components A and C fail.
- (ii) only components B and D fail.
- (iii) only components C, D, & E fail.

System #	Diagram	Scenario (i)	Scenario (ii)	Scenario (iii)	Reliability
1		F	F	F	d
2		S	S	F	c
3		S	F	F	b
4		S	F	F	h
5		F	F	F	e

For each system (#1-5) above, write the letter below indicating the **computation** of the 1-year reliability (i.e., survival probability):

- a. $1 - (0.3)^3(0.2)^2 = 0.99892$
- b. $1 - [1 - (0.7)^3][1 - (0.8)^2] = 0.76348$
- c. $[1 - (0.3)^3][1 - (0.2)^2] = 0.93408$
- d. $(0.7)^3(0.8)^2 = 0.21952$
- e. $(0.7)^3[1 - (0.2)^2] = 0.32928$
- f. $1 - (0.3)^3[1 - (0.8)^2] = 0.99028$
- g. $[1 - (0.3)^3](0.2)^2 = 0.03892$
- h. $[1 - (0.3)^3](0.8)^2 = 0.62272$
- i. $1 - (0.3)^3[1 - (0.8)^2] = 0.99028$
- j. *None of the above*