L#1 Review Questions (True/False)

1) _F___ A fault-tolerant system must have a high reliability
2) __T__ A highly reliable system is not necessarily fault-tolerant.
3) __T__ Reliability differs from availability in that reliability depends on an interval of time whereas availability is taken at an instant of time
4) __F__ A system's reliability is usually larger than a system's safety value
5) __F__ A TMR (triple modular redundancy) system is always more reliable than a simplex system without redundancy
6) __T__ A standby sparing design with one spare and perfect switching mechanism is always more reliable than a simplex system without redundancy

Reference (1)

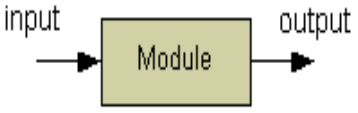
- Reliability, *R(t)* -- The conditional probability that a system performs correctly throughout an interval of time [t_0, t], given that it was performing correctly at time t_0.

- Availability, *A(t)* -- the probability that a system is operating correctly at the instant of time *t*.
  - Depends not only on how frequently the system becomes inoperable but also on how quickly it can be repaired

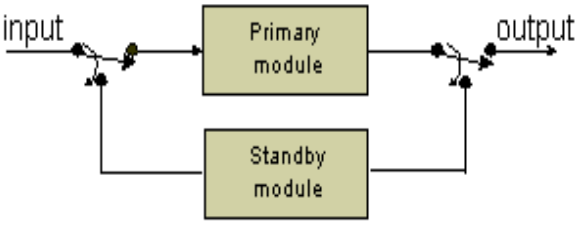
- Safety, *S(t)* -- the probability that a system *either* performs correctly *or* discontinues its operations in a "safe" manner.

Reference (2)

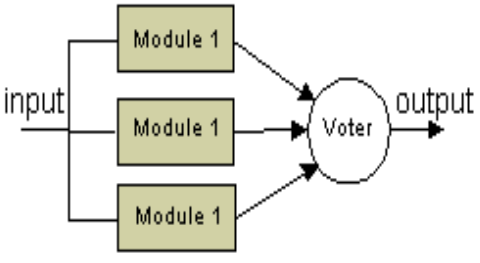
- A simplex system



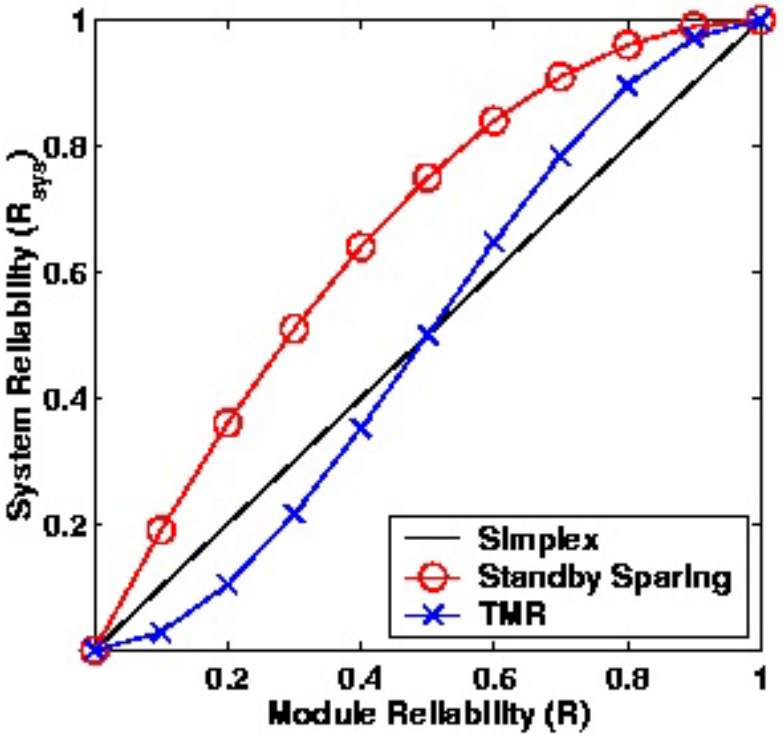
- Two alternative designs for tolerating 1 fault



(I): Standby sparing



(II): Triple modular redundancy (TMR)



- Standby sparing is the most reliable
- When $R>0.5$, TMR is better than simplex