Activity 7.2b – Test Reliability and Redundancy

1. List the four categories of cause for the failure of an engineered system. For each, give an example.

2. What is the overall system reliability of a car's ignition system that consists of a battery, key-switch, starter, and fuel pump? All components must function as designed in order for the car to start. The failure rates are: Battery 1 in 100,000; key-switch 1 in 250,000; starter 1 in 50,000; and fuel pump 1 in 35,000.

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3. In the case of the system in problem #2, if an engineer wanted to improve system reliability by improving only one component, which component would make the best choice to focus the improvement efforts? Justify your answer.

4. How many engines (individual failure rate is 0.0001) would a transoceanic airliner need if it was to have a one-in-a-billion chance of crashing due to engine failure during a flight? The plane can keep flying if any single engine is operating.

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