Computer Simulation

Assignment 1

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Problem 1
Jitter: Continuous, Dynamic and Stochastic.
Capacitor Lifetime: Continuous, Static and Stochastic.
Power consumption of a switch: Continuous, Static and Deterministic.
Processing n packets: Discrete, Dynamic and Deterministic.

Problem 2
Imagine a store clerk waiting for the next customer; the time it takes for the next customer to arrive is independent of previous customers.
Rolling a dice is also memoryless.
The time it takes for the next hardware failure to happen does not depend on previous failures and thus, it is also memoryless (this is the reason we can never predict hardware failures).

Problem 3

a

Advantages: can predict and avoid life threatening and dangerous situations - can speed up the passing of time and study a system's behavior in advance - Is cost effective (mostly)

Disadvantages: Missing a (seemingly) insignificant detail in the implementation can cause devastating losses in the result - It can be expensive to measure environmental variables and implement the software - To simulate something a thorough and complete understanding of that subject is required

b

LIFO (like a stack): The advantage is the processor is sure that the latest task in the queue is what it should work on; but the disadvantage is the earlier tasks can starve and never be attended to.

FIFO (first come first serve): It acts fairly in the sense that if the task arrives earlier it will be processed sooner, but on the flipside, tasks at the end of the queue will have to wait a long time.

HIFO (highest value first out): A valuing system must be designed and tasks must be valued according to it; then the task with the highest value will be attended to first. The advantage is clear, since important tasks will be done sooner, but on the other side, other tasks might starve.

c

Simulation software can be used to train new employees in an environment where real training can be both costly and risky.

In a business the risk-reward process in different aspects of the organization can be simulated via a simulation software and the results can assist the board of directors to decide the future plans of that business.

Problem 4
In the Jupyter notebook.

Problem 5
In the Jupyter notebook.

Problem 6
In the Jupyter notebook.