* Refer to the following system characteristics to answer question 1:
  + CPU (average time to execute **1,000** instructions): 1.2ms
  + Four (4) Hard Drives with the following average **Seek Times**:
    - Drive A: 35ms
    - Drive B: 10ms
    - Drive C: 5ms
    - Drive D: 50ms
  + Track Requests (**unordered**): 31, 20, 15, 20, 31, 15
    - Note: Assume drive heads start at track 0.

1. Answer the following questions about the above system:
   1. Which drive would require the **least** amount of time to access all of the **unordered** track requests?

Drive C

* 1. Which drive would require the **most** amount of time to access all of the **unordered** track requests?

Drive D

* 1. If the track requests were reordered, which drive would require the **least** amount of time to access all of the track requests (assume reordering requires 1,000 instructions)?

Track requests (reordered): 15, 15, 20, 20, 31, 31

Drive C

* 1. If the track requests were reordered, which drive would require the **most** amount of time to access all of the track requests (assume reordering requires 1,000 instructions)?

Drive D

1. Describe the following measurements of system performance:  
   1. Throughput

Measurement of the productivity of the entire system as a whole.

* 1. Capacity

The maximum throughput level.

* 1. Bottleneck

When resources overwhelm available resources and often critical resources and disrupt performance.

* 1. Response Time

Time required to process requests from a user. Counts from the very moment the user enters the request (Mouse click for example) to the time the system indicates the message.

* 1. Turnaround Time

Equivalent to response time but for batch jobs. From submission of job until output is returned to user.

* 1. Resource Utilization

How much are resources contributing to operations. (E.g. CPU usage by percent in Task Manager)

* 1. Availability

Probability a resource will be ready when a user needs it.

* 1. Reliability

Chances that a resource will not fail in a given time period.

1. Calculate the availability of a server with the following MTBF and MTTR values:

Availability =

* 1. MTBF: 3 years, MTTR: 8 hours

3 years = 26280 Hours

26280 / 26280 + 8

26280 / 26288 = 0.9997

* 1. MTBF: 2 weeks, MTTR: 36 hours

2 Weeks = 336 Hours

336 / 336 + 36

336 / 372 = 0.9032

* 1. MTBF: 1 day, MTTR: 25 hours

1 day = 24 hours

24 / 24 + 25

24 / 49 = 0.4898

1. Calculate the reliability of a server over the following time period and MTBF values:

Reliability = e-(1/MTBF)(t)

* 1. Time Period: 30 seconds, MTBF: 180 days

e to the power of: -(1/180)(30/86400)

= 0.9999

* 1. Time Period: 40 days, MTBF: 6 weeks

e to the power of: -(1/42)(40)

= 0.3858

* 1. Time Period: 25 hours, MTBF: 1 day

E to the power –(1/24)(25)

= 0.3529