Calculate Reliability

Question 1

An analytics group has build a distributed data lake as part of a new data warehouse. The data warehouse consists of a number of distinct components, including a database on a cloud server (99.987% availability), two identical database management system servers (99.3%), an analytics logic server (94.7%), and, of course, the network infrastructure to the cloud server, which has an availability of 98.37%. What is the overall availability of the system, expressed as a percentage with three digits of precision? Show your work.

The mathematical formula to caluclate teh system availability(SA) is: SA=(CloudServer)×(DBMSServer1)×(DBMSServer2)×

```
cloud_server<-0.99987 # converted percentages into decimals
dbms_server<-0.993 # here dbms servers are identical as given, so we are multiplying twice.
analytical_server<-0.947
infrastructure<-0.9837
system_availability<- cloud_server * (dbms_server ^ 2) * analytical_server * infrastructure
system_availability_percantage <- system_availability * 100
cat("System availability is",system_availability, "\n")
```

```
## System availability is 0.9184482
```

```
cat("The percentage of network infrasturcture avalability is",system_availability_percantage,"%")
```

```
## The percentage of network infrasturcture avalability is 91.84482 %
```

Question 2:

A RAID 1+0 storage system has an estimated MBTF of 1,450,000 hours. What is the expected annual reliability? Show your work.

To calculate the expected annual reliability of a RAID 1+0 storage system with an estimated Mean Time Between Failures (MTBF) of 1,450,000 hours, we'll use the exponential reliability function. This function is used to estimate the probability that a system will successfully operate without failure over a certain period of time. The mathematical formula for this is: R(t)=eˆ-t/MTBF where, R(t) is the reliability at time t, e is the base of the natural logarithm t is the time in hours for which we want to calculate the reliability, MTBF is the Mean Time Between Failures in hours.

```
MTBF <- 1450000
time <- 8760 # hours in a year

annual_reliability <- exp(-time / MTBF)
annual_reliability_percentage <- annual_reliability * 100
cat("The caluclated annual reliability percentage is", annual_reliability_percentage,"%")
```

```
## The caluclated annual reliability percentage is 99.39768 %
```