Solution to COMP9334 Revision Question for Week 2 – Part 1

These questions (with the exception of Question 6, which deals with Little's Law) can be solved by using different methods. You can use the operational laws. Alternatively, if you know the definitions and understand the relationships between variables, you can solve these questions from the first principles. You may choose whatever method you feel comfortable with. For question 7, I show two different methods.

Question 7

Method 1: Apply the operational Law

The system throughput was 7200/(60*60) = 2 requests per second.
By service demand law, the service demand at the disk is utilisation of the disk / system throughput = 0.3 / 2 = 0.15s.
The average number of accesses (= visit ratio) was 0.15s/30ms = 5.

Method 2: From first principles

The monitoring period was 60 minutes and the disk utilisation was 30%, that means the disk was busy for 60 * 0.3 = 18 minutes. During this 18 minutes, 7200 requests are completed, so each request took on average 18*60/7200 = 0.15s. Since each file operation took 30ms, thus the average number of visits was 0.15s/30ms= 5.

Question 5

The service demand law says that utilisation = service demand x system throughput.
Since the average service time is 30ms and every transaction visits the disk 3 times, each transaction requires a service demand of 3 x 30ms = 90ms. In one hour, 5400 transactions mean a throughput of 5400/3600 = 1.5 transactions/second. The utilisation is therefore 0.09*1.5 = 0.135.

Question 6

This question is solved by applying Little's Law to the computer network. The throughput of the network is 128 packets/s. The response time is the average delay experienced by the network = 100ms = 0.1s. Thus, the average number of packets (by Little's Law) is 128 * 0.1 = 12.8 packets.