

COMP9334 Revision Questions for Week 9

Question 1

Consider a composite web service which makes use of three web services. You can model this as a fork-join queue with 3 servers. Assuming that all the 3 servers have exponentially distributed service time with mean service rate μ . Assuming also that the service time distributions at all servers are independent. We showed in the lecture, by using Markov chain that the mean service time of the fork-join queue is given by

$$(1 + \frac{1}{2} + \frac{1}{3}) \frac{1}{\mu} \quad (1)$$

In this question, you will derive the same result using probability distribution.

- (a) What is the probability that the service time of the fork join queue is less than x ? (Hint: If the service time of the fork join queue is less than x , it means that the service time at each server must also be less than x .)
- (b) You have in fact derived the cumulative probability density in Part (a). Find the probability density of the service time of the fork join queue.
- (c) Using your result in Part (b), find the mean service time at the fork join queue.

Remark: An interesting exercise is to do that for n servers. I leave it to you.