COMP9334 Revision Questions Week 2A

The following question is Question 10 from Chapter 3 of Mensace et al. "Performance by Design". It has been reproduced below for your convenience.

It is then followed two questions on Poisson process on Page 2.

10. An interactive system has 50 terminals and the user's think time is equal to 5 seconds. The utilization of one of the system's disk was measured to be 60%. The average service time at the disk is equal to 30 msec. Each user interaction requires, on average, 4 I/Os on this disk. What is the average response time of the interactive system?

Questions on the arrival process.

Question 1. If the inter-arrival time of requests at a server is exponentially distributed with a mean rate of 20 requests per second, answer the following questions.

a) What is the mean inter-arrival time?
b) Over a duration of 1 minute, what is the mean number of requests arriving at the server?
c) Over a duration of 1 minute, what is the probability of having no arrivals at the server?
d) Over a duration of 1 minute, what is the probability of having 10 arrivals at the server?

Question 2. This question is about Poisson Process. A server receives requests from two arrival processes. Both arrival processes are Poisson. The rates of these two processes are r_1 and r_2 respectively. Assuming these two processes are independent, prove that the aggregation of these two arrival processes is also Poisson. What is the aggregated arrival rate?