

## SFWR ENG/COMP SCI 4/6E03 — Tutorial 9/16

1. A distributed system has four file servers ( $A, B, C, D$ ). For a file creation, the servers are chosen independently with probabilities  $1/2, 1/6, 1/6, 1/6$ , respectively. Determine the probabilities of the following events:
  - (a) Server  $C$  is selected
  - (b) Server  $C$  or  $D$  is selected
  - (c) Server  $C$  is not selected
  - (d) Server  $C$  is chosen twice in a row
  - (e) For four successive file creations, the server selection sequence  $ABCD$  is observed.
2. A processor is idle at time  $t$ . The time of the next task arrival is uniformly distributed between  $t$  and  $t + 30$  seconds. What is the probability that the processor remains idle for between 5 and 15 seconds (after time  $t$ )?
3. A continuous random variable  $X$  takes values between 1 and 2 with a cdf

$$F(x) = A + Bx.$$

- (a) Find the values of  $A$  and  $B$  and sketch the cdf.
  - (b) What is  $P(1 \leq X \leq 1.3)$ ?
  - (c) Construct and sketch the pdf.
  - (d) Find  $E(X)$ ,  $\text{Var}(X)$ .
4. The time between user requests to a server is exponentially distributed with rate  $\lambda = 4$  per hour.
  - (a) What is the expected time between requests?
  - (b) It is now 3:00. The last request was made at 2:50. What is the probability that a request is made before 3:15?
5. The response times (in seconds) of two different servers are measured, with the following data points for each
  - (i) Server 1: 2.19, 0.47, 6.79, 6.79, 9.35, 3.84, 5.19, 8.31, 0.35, 0.53, 5.30, 6.71, 0.08, 3.83, 0.67, 4.17, 6.87, 5.89, 9.30, 8.46
  - (ii) Server 2: 6.27, 1.92, 7.54, 5.16, 8.01, 10.10, 8.62, 3.62, 1.47, 8.36, 4.28, 7.33, 8.56, 10.91, 4.65, 3.47, 10.83, 8.23, 8.53, 7.52

Would you recommend one server over the other? Justify your answer using appropriate statistical tests.