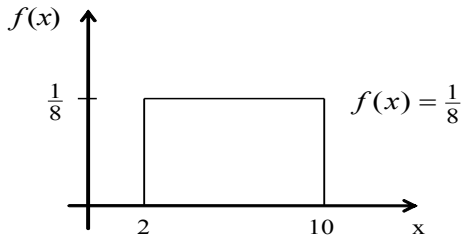
CX2100 Prob & Stat

Tutorial #4

Continuous Probability Distribution

1. The figure below shows the graph of the uniform continuous distribution of a random variable that takes on values on the interval from 2 to 10. Find:



   (a) P(X < 7)
   (b) E(X)
   (c) Var(X)

2. The waiting time for one to be served in a queueing system is a random variable having an exponential distribution with an average of 4 minutes.
   (a) Determine the variance of the waiting time.
   (b) What is the probability that one has to wait for at least 10 minutes before being served?

3. The cumulative distribution function of the r.v. X is given below:

$$F(x) = \begin{cases} 0, & x < 1 \\ 1 - x^{-3}, & x \geq 1 \end{cases}$$

   (a) Determine the probability density function of X.
   (b) Calculate E[X] and var[X].

4. Given a r.v. having the normal distribution with $\mu = 16.2$ and $\sigma^2 = 1.5625$, find the probabilities that it will take on a value (use the standard normal distribution table)
   (a) greater than 16.8
   (b) between 13.6 and 18.8

5. Studies have shown that 22% of all patients taking a certain antibiotic will get a headache. Use the normal approximation to the binomial distribution to find the probability that among 50 patients taking this antibiotic
   (a) at least 10 will get a headache
   (b) at most 15 will get a headache

Answers

1. (a) 0.625 (b) 6 (c) $\frac{16}{3}$

2. (a) 16 (b) $e^{-2.5}$

3. (a) $f(x) = \begin{cases} 0, & x < 1 \\ 3x^{-4}, & x \geq 1 \end{cases}$ (b) 3/2 (c) 3/4

4. (a) 0.3156 (b) 0.9624

5. (a) 0.6950 (b) 0.9382