

M241 Review for Final Exam 001

8:00 A.M. Wed December

YOU MAY BRING ONE PAGE (8.5 X 11) OF ***YOUR OWN HANDWRITTEN***
NOTES TO THE EXAM

(* questions on new material from Chapter 6 covered this week not previously tested).

1. One problem on:

Drawing a Venn Diagram representing sets and set operations

(i.e. shade the set $(A \cup B)^c$, then calculating probabilities of sets using Complement, Inclusion-Exclusion, and Difference rule.

2. One problem on computing conditional probability using the general formula for $P(A|B)$ (or the multiplication rule form of same) in a tree diagram form and then using Baye's Rule to compute the reverse tree probabilities. Review the problem on this on your first exam.

3. One or more problems that make sure you know how to count permutations and combinations -- recognizing when to use each.

4. One problem on computing the probability of a sequence of events using the multiplication rule.

5. A problem that is modeled as a series of independent Bernoulli trials – e.g. computing number of successes in n Bernoulli trials (using Binomial distribution).

6. A problem that involves a large number of trials that are independent and identically distributed and we are to compute probabilities of events for either Sum or Average of these. (Hence, you will be applying the Central Limit Theorem, Square Root Law, and using a table with Normal(0,1) distribution.)

7. A problem modeled by the hypergeometric distribution (Sampling without replacement - Good and Bad)

8. Given a particular simple discrete distribution, calculate the mean, variance, and standard deviation.

9. Given a particular continuous distribution's density function, calculate the probability $P(X \text{ is in } B)$ for some interval or set B , the mean, variance, standard deviation.

10. a) Given a joint distribution (*discrete or continuous*), calculate the marginal distributions and determine whether the random variables are independent or dependent.

* b) Calculate the covariance, and correlation, of the random variables.

* c) For jointly distributed discrete random variables,

- calculate the conditional distribution of X given Y
- calculate the conditional expectation $E(Y | X = x)$

11. Given a Poisson process, calculate probability involving:

- waiting time until first arrival
- waiting time until the r 'th arrival (for some r)
- number of arrivals in time t .

Example: Let customers arrive at a bank according to a Poisson process with a mean interarrival time of 15 minutes. Calculate the probability that at least 3 customers will arrive in one hour. Calculate the probability that waiting time for the first customer after 12:00 noon is at least 20 minutes. Calculate the probability that no customers will arrive during the first 10 minutes.

12. Electrical component problem like the ones assigned in exercises either in serial or parallel.

13. A problem involving computing probabilities for jointly distributed independent Uniform(a,b) random variables like the last assigned exercises and examples from section 5.1, and the last test.

14. Given a continuous joint density function $f(x,y)$, compute:

a) $P[(X,Y)$ is in some region B]

b) marginal densities f_x and f_y , and determine whether X and Y are independent.

c) $E(X)$, $E(Y)$,

* d) $E(XY)$, $Cov(X,Y)$, $Corr(X,Y)$