

NANYANG TECHNOLOGICAL UNIVERSITY
SPMS/DIVISION OF MATHEMATICAL SCIENCES

2016/17 Semester 1 MH2500 Probability and Introduction to Statistics Tutorial 9

For the tutorial on 20 October, let us discuss

- Ex. 4.7.10, 18, 26, 29, 32, 36.

Ex. 4.7.10. A list of n items is arranged in random order; to find a requested item, they are searched sequentially until the desired item is found. What is the expected number of items that must be searched through, assuming that each item is equally likely to be the one requested? (Questions of this nature arise in the design of computer algorithms.)

Ex. 4.7.18. If U_1, \dots, U_n are independent uniform random variables, find $E(U_{(n)} - U_{(1)})$.

Ex. 4.7.26 A stick of unit length is broken into two pieces. Find the expected ratio of the length of the longer piece to the length of the shorter piece.

Ex. 4.7.29. Prove Corollary A of Section 4.1.1.

If X and Y are independent random variables and g and h are fixed functions, then $E[g(X)h(Y)] = \{E[g(X)]E[h(Y)]\}$, provided that the expectations on the right-hand side exist.

Ex. 4.7.32. Let X have a gamma distribution with parameters α and λ . For those values of α and λ for which it is defined, find $E(1/X)$.

Ex. 4.7.36. Let X be uniform on $[0, 1]$, and let $Y = \sqrt{X}$. Find $E(Y)$

- (a) by finding the density of Y and then finding the expectation, and
- (b) by using Theorem A of Section 4.1.1. (i.e., $E(Y) = \int_{-\infty}^{\infty} g(x)f(x)dx$.)