3342 Review: Chapters 4 - 6

Terms and Representative Problems

Chapter 4

random variable
probability distribution 2-5
$f(x) \geq 0$
$\sum_{all\ x} f(x) = 1$
discrete random variable
continuous random variable
probability histogram
cumulative distribution function

binomial distribution 13-20
two outcomes per trial
p(success) same for all trials
fixed number, n, of trials
trials are independent
binomial distribution function
b(x;n,p) 7
cumulative binomial distribution function
B(x;n,p)
symmetric
positively skewed
negatively skewed

hypergeometric distribution 23-28
sampling without replacement
hypergeometric distribution function
h(x;n,a,N)

mean 32, 34
binomial 38-39
hypergeometric
variance and standard deviation 32, 34
binomial
hypergeometric
kth moment about the origin
alternate formula for variance 33, 35

Chebyschev's Theorem 46-47
law of large numbers

Poisson distribution 56-59
mean and variance
approximation to binomial 54-55
Poisson process 65-66
geometric distribution 62, 64
mean and variance

Chapter 5

probability density function 2, 4, 6, 9-10, 108
$f(x) \geq 0$
$\int_{-\infty}^{\infty} f(x)\,dx = 1$
distribution function 5
kth moment about the origin
mean, variance and standard deviation 13-14

normal distribution 24, 27, 29, 31, 33
mean and variance
standard normal distribution 19-21, 112-113
Table 3
standardized random variable
$Z = \frac{X - \mu}{\sigma}$

normal approximation to binomial 35-39
continuity correction

uniform distribution 46, 110
log-normal distribution 50-51, 55, 115

gamma distribution 54
gamma function
functional equation $\Gamma(x+1) = x\Gamma(x)$

exponential distribution 58-60, 117
waiting time between successive arrivals
beta distribution 64-65

Chapter 6

population
    finite
    infinite
sample
random sample
    finite population
    infinite population
population parameters
sample statistics

sampling distribution

Theorem 6.1 Mean and variance of a sampling distribution

$$\mu_{\bar{x}} = \mu$$

$$\sigma^2_{\bar{x}} = \frac{\sigma^2}{n} \quad \text{or} \quad \frac{\sigma^2}{n}\frac{N-n}{N-1}$$

finite population correction factor

standard error of the mean

$$\sigma_{\bar{x}} = \sigma / \sqrt{n}$$

standardized sampling mean 15-17

$$Z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$$

Theorem 6.2 Central Limit Theorem

a) normal distribution approximation for sampling distribution of the mean for $n \geq 25$
b) sampling distribution of the mean is normal if population normal

t-distribution 20-24
    degrees of freedom
    Table 4

standard normal distribution approximation for *t*-distribution for $n \geq 30$

sampling distribution of the variance

chi-square distribution 27
    Table 5

F-distribution
    Table 6
left-hand probability 26

$$F_{1-\alpha}(\nu_1, \nu_2) = \frac{1}{F_{\alpha}(\nu_2, \nu_1)}$$