3342 Review: Chapters 4 - 7.2

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 22-27
sampling without replacement
hypergeometric distribution function
h(x;n,a,N)

mean 30, 32
binomial 38-39
hypergeometric
variance and standard deviation 30, 32
binomial
hypergeometric
kth moment about the origin
alternate formula for variance 31, 33

Chebyschev's Theorem 44-45

law of large numbers

Poisson distribution 54-57
mean and variance
approximation to binomial 52-53
Poisson process 63-65

geometric distribution 60, 62
mean and variance
multinomial distribution 70, 72
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
$Z = \frac{X - m}{s}$

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
Weibull distribution 68-69, 121

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

$$m_{\bar{x}} = m$$

$$s^2_{\bar{x}} = \frac{\frac{s^2}{n}}{\frac{s^2}{n}\frac{N-n}{N-1}}$$

finite population correction factor

standard error of the mean

$$s_{\bar{x}} = s/\sqrt{n}$$

standardized sampling mean 15-17

$$Z = \frac{\bar{x} - m}{s/\sqrt{n}}$$

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

$$F_{1-a}(n_1, n_2) = \frac{1}{F_a(n_2, n_1)}$$

Chapter 7

point estimation

parameter
estimator
    estimate of standard error

unbiased estimator
more efficient unbiased estimator

maximum error of estimate 6, 8-12

$$E = z_{a/2}\frac{s}{\sqrt{n}}$$

confidence

interval estimate
confidence interval 15, 17-21

$$\bar{x} - z_{a/2}\frac{s}{\sqrt{n}} < m < \bar{x} + z_{a/2}\frac{s}{\sqrt{n}}$$

degree of confidence
confidence limits