norm approx always is < exact value $= \binom{n}{k}(\pi)^k(1-\pi)^{n-k}$

Chap 8

norm approx = z of $\frac{K-\mu}{\sigma}$

Cont. corr.
same as norm apprx just take .5 from values

Chap 9

Poisson rand var

$e^{-\lambda}\left(\frac{\lambda^y}{y!}\right)$ $\lambda = n\pi$ $\sigma = \sqrt{\lambda}$

$Var(y) = \lambda$

Poisson also useds ~~exact~~ norm approx from Chap 8 for exact, and norm

Chap 10

independence of rand var

if $Pr(E \text{ and } F) = Pr(E)Pr(F)$

f_{xy} inside = 1

$Var(x+y) = \{E(x^2)+2E(XY)+E(y^2)\} - \{E^2(x)+2E(x)E(Y)+E^2(Y)\}$

State Ho, reject region use it to answer

14, Sample of 100 38 say they are past data = 30% sigf of 5%

Chap 12

z test $\bar{x} = 630$, $s = \sigma = 80$

$\mu = 612$, $n = 100$, $\alpha = 5\%$

$H_0 = \mu = 612$ $H_a: \mu > 612$

$\frac{\bar{X}_{.95} - 612}{80/\sqrt{100}} = z_{.95} = 1.6449$ ← rearrange to find $\bar{x}$

So $\bar{X}_{.9} = 625.16$ $630 > 625$ so reject Ho.

2-sided test

n: 25 taken $\sigma = 2$ $\mu = 40$ 95% interval

$n = 121$ $\hat{K} = .64$ $K = \hat{K}n = .64(121) = 77$ $H_0 = \pi = .5$ $H_a = \pi \neq .5$

$\mu = n\pi = 61.5$ $\sigma = \sqrt{n\pi(1-\pi)} = 5.5$ ← so rearrange for $K_{.975}$

So $\pi = .5/2 = .25 \to \frac{K_{.975} - 61.5}{5.5/\sqrt{121}} = \pm z_{.975} = 1.96 \to K_{.975} = 61.5 \pm .98$

$77 > 62.7$ reject

exam questions

exam 1

Q6) $P(H) = \frac{2}{3}$, all heads $= \left(\frac{2}{3}\right)^3 = \frac{8}{27}$, the same $= \left(\frac{2}{3}\right)^3 + \left(\frac{1}{3}\right)^3 = \frac{1}{3}$, 2 H's $= \left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)^1$ least 1 T = 1 − all heads

exam 2

Q3) 600 rolls of a die $\frac{100}{}$, give or take 9.13 $\mu = n\pi = 600(\frac{1}{6}) = 100$

Q2) n girls of x children $\binom{x}{n}(.5)^n(.5)^{x-n}$ $\sigma = \sqrt{n\pi(1-\pi)} = 9.13$

Q4) 25% inc call 25 calls $\binom{25}{n}(.25)^n(.75)^{25-n}$

Q6) Type 1 is if die is fair, Type 2 is die is loaded

exam 3

Q1) $\int_{-\infty}^{x} f t\,dt = \int_{-1}^{x}(2t+2)dt = (t^2+2t)\Big|_{-1}^{x} = (x^2+2x)-(1-2) = x^2+2x+1$

Q2) $Pr(-1 \le x \le 1) = Pr(X \le 1) - Pr(X < -1) = F(1) - F(-1) = 1 - \frac{1}{2}e^{-1} - \frac{1}{8}(1-4+4) = \frac{7}{8} - \frac{1}{2e}$

Q3) $\pi = .05$ $\mu = n\pi = 10$ $\sigma = \sqrt{n\pi(1-\pi)} = \sqrt{9.5}$

$Pr(8 < x < 12) = Pr(9 \le x \le 11) = Pr(8.5 \le X \le 11.5) = Pr\left(\frac{8.5-10}{\sqrt{9.5}} \le z \le \frac{11.5-10}{\sqrt{9.5}}\right) = .3735$

Q4) $\mu = 100$ $\sigma = 15$ 80^{th} IQ test $\frac{X_{.8} - 100}{15} = z_{.8} = .8416 \to X_{.8} = 112.6 = 113$

Q5) Chebs of 2.5 $\to 1 - \frac{1}{2.5^2} = 1 - .16 = .84$

Q6) 4 break, 2 months $\lambda = 3 \cdot 2 = 6$ so $= e^{-6}\left(\frac{6^0}{0!}+\frac{6^1}{1!}+\frac{6^2}{2!}+\frac{6^3}{3!}+\frac{6^4}{4!}\right) = .2851$

Q8) exp with mean 10 min

$f(t) = \begin{cases} \frac{1}{10}e^{-\frac{t}{10}}, & t \ge 0 \\ 0, & \text{elsewhere} \end{cases}$

$Pr(8 < t < 12) = Pr(t \le 12) - Pr(t \le 8)$

$= F(12) - F(8) = e^{-.8} - e^{-1.2} = .1481$

Chapter 1 error analysis

average = $\frac{\text{sum of values}}{\text{\# of values}}$ MA = $\frac{|\text{sum of values}|}{\text{\# of values}}$ RMS = $\sqrt{\frac{v_1^2 + v_2^2 \ldots v_n^2}{n \text{ values}}}$

$SE_p = \frac{1}{2\sqrt{n}}$ example; group mean = $\frac{4(7)+3(7.1)+1(7.2)+3(7.\ldots)+2(7.25)}{13}$

$= 7.27$

Stem/leaf

1	1, 2
2	0, 3
3	4, 9

5# sum med = middle # q_3 = mid of med/max q_1 = mid of min/med

Chapter 2

frequency table / histogram

# item	freq	%
2	1	1/5
3	3	3/5
4	1	1/5

density = $\frac{\text{freq}}{\text{width}}$

5# Summary min, q1, med, q3, max

range = max − min IQR = $q_3 - q_1$

q_3 = max − med q_1 = med − min

box plot; min q1 med q3 max

group mean; $\frac{\text{sum of values}}{\text{\# of values}}$

varience = $\frac{\text{sum of (values − mean)}^2}{\text{\# of values} - 1}$ Standard dev. = $\sqrt{var}$ stan error = $\frac{var}{\sqrt{n}}$

est stan error = $\frac{\text{stan dev}}{\sqrt{n}}$

examples;

	F	A	
M	15	45	50
Fe	4	36	40
	19	81	100

P(F) = 19/100 p(F|A) = 36/81

P(F|M) 15/60

Chapter 3

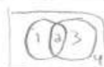
definitons of probability

U = or ∩ = and ' = not

Pr(E') = 1 − Pr(E)

X choosen; $\binom{x}{n} = \frac{x!}{n!(x-n)!}$

Venn diagram



E_1 = left circle E_2 = right

E_1 = 1 U 2 E_2 = 2 U 3

$E_1 \cap E_2 = 2$

$E_1 \cup E_2 = 1 \cup 2 \cup 3$

event rules

Pr(E∩F) = Pr(E)·Pr(F)

independant − Pr(E|F) = Pr(E), Pr(E|F) = Pr(E|F')

non − ind − Pr(E∩F) = Pr(E)·Pr(F|E), Pr(F|E) = $\frac{Pr(E \cap F)}{Pr(E)}$

Demorgan's − (E U F)' = (E)' ∩ (F)', (E∩F)' = (E)' U (F)'

trees 1+2+3+4 = 1

Bayes method = Pr(thing | total) = $\frac{\text{chance of thing given total}}{\text{all chances of total}}$

Chapter 4

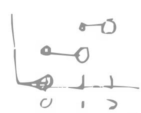
Prob mass fun Piecewise f(x) { 0, x<1 ; .4, 1≤x<3 ; .3, 3≤x<4

x	f(x)
0	$.48^3$ =
1	$3(.52)^1(.48)^2$ =
2	$3(.52)^2(.48)^1$ =

Var = $E(x^2) - E(x)^2$ σ = $\sqrt{var}$

cdf

x	f(x)
0≤x<1	f(0) =
1≤x<2	f(0)+f(1) =
2≤x<3	f(0)+f(1)+f(2) =



$\mu = \frac{n+1}{2}$

$\sigma^2 = \frac{\ldots - 1}{12}$

uniform rand

Chap 5

Success / fail

$\mu = E(x) = \pi$

$\sigma = \sqrt{\pi(1-\pi)}$

var = same as ... sq

$\mu = n\pi$

binomial rand var

$\binom{n}{k} = \frac{n!}{k!(n-k)!}$

$K = n\pi \pm \sqrt{n\pi(1-\pi)}$

Var = $n\pi(1-\pi)$

$\sigma = \sqrt{Var}$

hyper geo

Put $\frac{N-n}{N-1}$ infront of Var, σ

Chap 6

Error type if Pr(K≥10|n=...)

$\binom{n}{k}(\pi)^k(1-\pi)^{n-k}$ For K=10 + K=11 + K=12 if that is < α retain H0

Sign test same as Error just for ... value ... based on med value

Binomial exact test thing is based off H0 = π or same value

total

Chap 7

density func

f(x) { blah, 0<x<c ; 0, elsewhere

get from derv of F(x)

cum dist func

F(x) { 0, for x<0 ; blah, 0≤x<2 ; 1, x≥2

get from anti derv of f(x)

to find the Prob. using the 2 funcs Put value given inplace of X;

Var/stan dev = $E(x^2) - \mu^2$, $\sqrt{var}$

z score = $\frac{X-\mu}{\sigma}$ Chebyshev = $1 - \frac{1}{r^2}$

use Problems Problems to figure out 7.2