Key 5.4-5.5

26 a) $P(8 \le x \le 10) = P(x \le 10) - P(x \le 7) = .902 - .512 = .390$

b) $\mu = 25(.3) = 7.5 \quad s = \sqrt{25(.3)(.7)} = 2.2913$

$P(8 \le x \le 10) = P(7.5 \le x \le 10.5) = P\left(\frac{7.5-7.5}{2.2913} \le z \le \frac{10.5-7.5}{2.2913}\right)$

$= P(0 \le x \le 1.31) = .4049$

.390 vs. .4044 not too bad

29 $\mu = 100(.2) = 20 \quad s = \sqrt{100(.2)(.8)} = 4$

$P(x > 22)$ binomial $= P(x > 22.5)$ normal $= .5 - P\left(z < \frac{22.5-20}{4}\right)$

$= .5 - .2324 = .2676$

30 $\mu = 20 \quad s = 4 \quad P(x \ge 22)$ binomial $= P(x > 21.5)$ normal

$= .5 - P\left(z < \frac{21.5-20}{4}\right) = .3520$

32 a) $n = 20 \quad p = .4 \quad P(x \ge 10) = 1 - P(x \le 10) = 1 - .755 = .245$

b) $\mu = 20(.4) = 8 \quad s = \sqrt{20(.4)(.6)} = 2.191$

$P(x \ge 9.5) = .5 - P\left(z < \frac{9.5-8}{2.191}\right) = .2483$

35 x = # of guests claiming a room (discrete) $\quad p$ = prob guest claim room $= .9$ (Binomial)

$n = 215$

use normal approx b/c $215(.1)$ and $215(.9)$ are both ≥ 5

$\mu = 215(.9) = 193.5 \quad s = \sqrt{215(.9)(.1)} = 4.399$

$P(x \le 200)$ binomial $= P(x < 200.5)$ normal $= P\left(z < \frac{200.5-193.5}{4.399}\right) + .5$

$= P(z < 1.59) + .5 = .9441$

discrete Binomial choices: between 45 64, not

38 $n = 500$ X = # of householders between 45 and 64

$p = .31$ $q = .69$

$n(p) = 155$ $n(q) = 345$ so by rule of thumb we can approximate

a) $P(x < 135) \approx P(X < 134.5) = .5 - P\left(z < -\frac{155 - 134.5}{10.342}\right)$

$\mu = 155$ $s = \sqrt{500(.31)(.69)} = 10.342$ $= .5 - P(z < 1.98) = .0239$

b) $P(135 \le x \le 180)$ binom $\approx P(134.5 \le X \le 180.5)$

standard normal transformation $= P(-1.98 \le z \le 2.47) = .4761 + .4932 = .9693$

39 x = # of workers that exceed national median $p = .5$ $q = .5$ exceed, don't b/c median (discrete)

$n = 25$ $25(.5)$ and $25(.5)$ exceed 5 so we can approximate

a) $P(x \ge 20) = 1 - P(x \le 19) = 1 - .998 = .002$

b) $\mu = 12.5$ $s = \sqrt{25(.5)(.5)} = 2.5$ $\approx P(x \ge 19.5) = .5 - P\left(z \le \frac{19.5 - 12.5}{2.5}\right)$ 2.8

$= .0026$

c) your sample may not be representative of the whole

descrete showup don't binomial

70 x = # of people who don't show up $q = .95$ $p = .05$

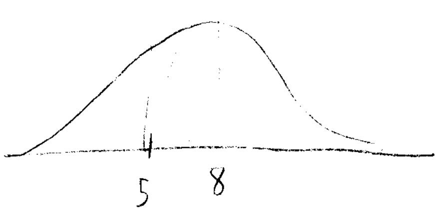
$n = 160$ $(160)(.05) = 8$ $(160)(.95) = 152$ ≥ 5 so we can appoximat

$\mu = 8$ $s = \sqrt{160(.95)(.05)} = 2.7$

$P(x \ge 5)$ binomial $\approx P(x > 4.5)$ normal $= .5 + P\left(z < \frac{4.5 - 8}{2.7}\right)$ 1.27

$= .5 + .3980$

$= .8980$



75 x = yeild (eponential) $\mu = 4$ $4 = 1/\lambda \Rightarrow \lambda = .25$

a) $P(x>10) = e^{-.25(10)} = .0821$

b) $P(x < x_{95}) = .95$ to get as formula $P(x > x_{95}) = .05$

$e^{-.25(x)} = .05 \Rightarrow -.25x = \ln .05$

$x = -\frac{\ln .05}{.25} = 11.98\%$

76 x = time it takes to repair flax (in minutes) $x \sim U(5,15)$

a) $P(x>10) = P(10 < x < 15) = \frac{15-10}{15-5} = .5$

b) $P(x<10) = 1 - P(x>10) = .5$ so $\underset{.5}{P(x<10)}\underset{.5}{P(x<10)} = .25$

independent

77 x = time (days) before copy machin malfunctions $\mu = 30 = 1/\lambda$ so $\lambda = 1/30$

a) $P(x \leq 30) = 1 - P(x > 30) = 1 - e^{-(1/30)30} = .6321$

b) $P(x < x_0) = .2 = P(x > x_0) = .8 \Rightarrow .8 = e^{-(1/30)x_0} \Rightarrow \ln .8 = -(1/30)x_0$

$x_0 = -30 \ln .8 = 6.69$

service the machine every 6 days

78 x = amont of sold (in gallon) per week $x \sim U(5000, 15000)$

a) $P(x \geq 12000) = P(12000 \leq x \leq 15000) = \frac{15000-12000}{15000-5000} = .3$

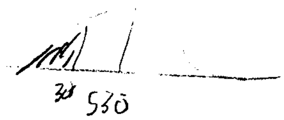
b) $P(x > c) = .001 = \frac{15000 - c}{15000-5000} = .001 \Rightarrow c = 14,990$ gallons in tank

84 $X =$ daily sales $\quad X \sim N(530, 120)$

a) $P(X > 700) = .5 - P\left(Z < \frac{700 - 530}{120}\right) =$

$= .5 - P(Z < 1.42) = .5 - .4222 = \underline{.0778}$

b) $P(X < 300) = P\left(Z < \frac{300-530}{120}\right) = .5 - P(Z < +1.92)$



$= .5 - .4726 = \underline{.0274}$

79. a) $e^{-\lambda(45)} = .53 \qquad -\lambda(45) = \ln .53 \qquad -\lambda = \frac{\ln .53}{45}$

$\lambda = -\frac{\ln .53}{45} = .0141$

$\frac{1}{.0141} = \mu \Rightarrow \mu = 70.88$

b) $P(X > 60) = e^{-.0141(60)} = .429$