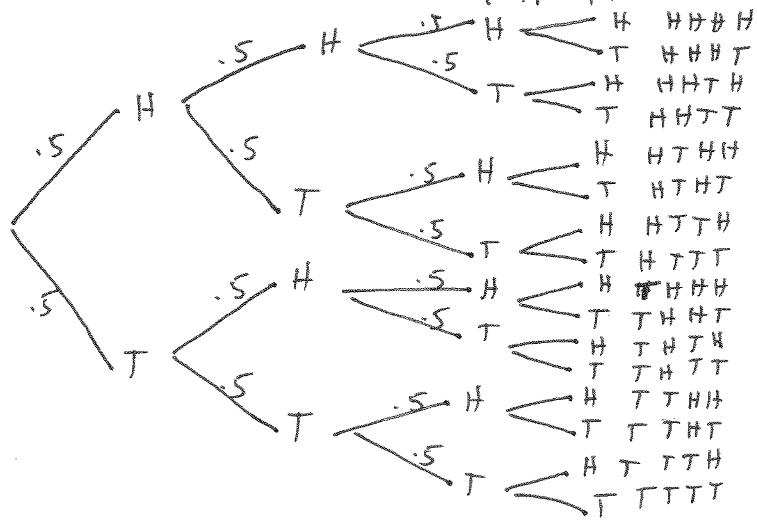
Stats CH6-1 A 1, 5, 7, 9, 13

Each .0625

(1)



Heads

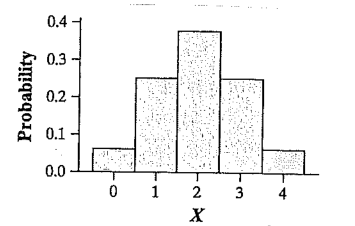
(a)

1. (a)

Value:	0	1	2	3	4
Probability:	0.0625	0.25	0.375	0.25	0.0625

(b) The histogram shows that this distribution is symmetric with a center at 2.

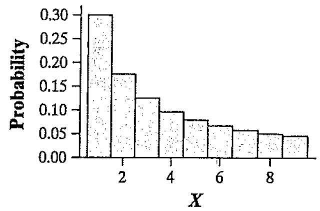
(b)



(5)

a) Yes all between 0 & 1, adds to 1

b)



(c) $P(X \le 3) = 1 - .0625 = .9375$

93.75%

that you will get 3 or fewer heads on 4 tosses

c) the first digit is 6 or greater

d) the first digit is at most 5 $\{X \le 5\}$ $P(X \le 5) = .778$

(7) A: $\{7, 8, 9\}$ $P(A) = .155$

B: $\{1, 3, 5, 7, 9\}$ $P(B) = .609$

C: $\{1, 3, 5, 7, 8, 9\}$ $P(C) = .66$ this is not the same as $P(A) + P(B)$ - NOT MUTUALLY EXCLUSIVE

(9) A: If x = "net gain"

$.25(3) + .75(-1) = 0$

Fair game

Book Answer - I don't Like

If x = amount gained

$.25(3) + .75(0) = .75$

expect .75 back on $1 played

(13) a) symmetric, red line = center

b) $\mu_X = 3.441$ Average all first digits, see if it is near 3.4 or 5

c) $P(Y > 6) = .333$

$P(X > 6) = .155$ Same near .333 or .155

Benfords

Stats CH 6-1 B 14, 18, 19, 23, 25

(14) a)

Death age:	21	22	23	24	25	26 or older
Profit:	−$99,750	−$99,500	−$99,250	−$99,000	−$98,750	$1250
Probability:	0.00183	0.00186	0.00189	0.00191	0.00193	0.99058

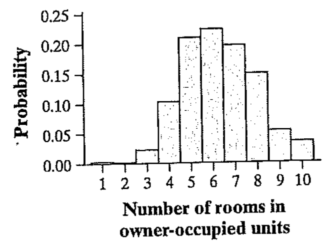
b)

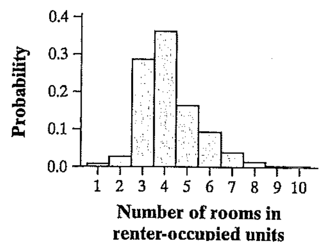
c) $\mu_Y = 303.35$ The company makes an average of $303.35 per policy.

(18) a) the law of large numbers describes that the mean will be close to the true mean given a very large number of data points.

b) $9707.57

(19) a)





(a) The distribution of the number of rooms is Roughly symmetric for owners and skewed to the Right for renters. Overall, renter-occupied units tend to have fewer rooms than owner-occupied units.

b) $\mu_X: 6.284$ (owner mean) $\mu_Y: 4.187$ (renter mean)

This matches part a : owner > renter

c) $\sigma_X: 1.64$ $\sigma_Y: 1.31$ We expect a wider dist. for owners renters is less spreadout, more concentrated

(23) $z = \frac{9-6.8}{1.6} = 1.38$ $P(z \geq 1.38) = .0838$

there is an 8% chance that the score is 9 or higher

(25) $\mu = .56$ $\sigma = .019$ a) $P(.52 \leq V \leq .6) = .965$ by AP Stat Prog.

b) $P(V \geq .72) = 0$ so it is near impossible for this to happen "get a sample with 72% voting"

Stats CH 6-2 C 27-30, 37, 39-41, 43, 45

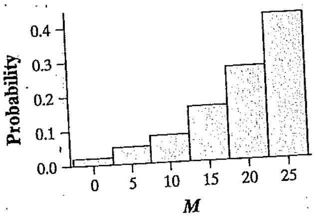
(27) (b) $.13 + .05 + .02 = .2$

(28) c $0 \cdot .09 + 1 \cdot .36 + 2 \cdot .35 + 3 \cdot .13 + 4 \cdot .05 + 5 \cdot .02 = 1.75$

(29) c $\frac{4}{52}(10) + \frac{48}{52}(-1) = -.1538$

(30) a $\frac{13}{52}(2) + \frac{39}{52}(-1) = -.25$

(37) a)



Skewed Left, most of the time the ferry makes \$20 or \$25

b) $\mu_M = 5(3.87) = 19.35$ the ferry makes \$19.35 per trip on ave.

c) $\sigma_M = 5(1.29) = 6.45$ the indiv. amounts made will vary about \$6.45 from the mean, on ave.

(39) a) $\mu_G = 10(7.6) = 76$

b) $\sigma_G = 10(1.32) = 13.2$

c) $\sigma_x^2 = 1.32^2 = 1.7424$ $\sigma_G^2 = [10\sigma_x]^2 = 100\sigma_x^2 = 100(1.7424) = 174.24$

the variance of G is 100 times that of X

(40) a) $\text{median}_G = 10(8.5) = 85$

b) $IQR_G = 10(9-8) = 10$

c) Shape of G is same as X. Skewed Left ← Mean < Median And Min to Med = $8.5 - 4 = 4.5$ Max to Med = $10 - 8.5 = 1.5$

(41) $Y = M - 20$

a) $\mu_Y = \mu_M - 20 = 19.35 - 20 = -.65$ they lose .65 per trip, on average

b) $\sigma_Y = \sigma_M = 6.45$ the profit will vary \$6.45 from the mean of -.65 per trip, on ave.

(43) a) $\mu_M = 6(3.87) = \cancel{23.34}$ 23.22 $\mu_Y = \mu_M - 20 = 23.22 - 20 = \$3.22$

$\sigma_M = 6(1.29) = 7.74$ This is equal to σ_Y

(45) $\mu_C = 8.5$ $\sigma_C = 2.25$ $F = \frac{9}{5}C + 32$

a) $\mu_Y = \frac{9}{5}(8.5) + 32 = 47.3°F$ $\sigma_Y = \frac{9}{5}(2.25) = 4.05°F$

b) $P(Y < 40) =$ $z = \frac{40 - 47.3}{4.05} = -1.802$ $P(z < -1.802) = .0357$

Stats CH 6-2 D 49, 51, 57-59, 63

(49) a) Dep. - w/o replacement, the 3rd card depends on the first 2

b) Indep. - 1st roll doesn't affect 2nd

(51) a) Yes means always can be added

b) NO - x & y must be indep to add variances, we don't know this.

(57) X = earnings for company $W = .5X + .5Y$

$\mu_{X_1} = 303.35$ $\mu_{X_2} = 303.35$ $\mu_W = 303.35$ $\sigma_x = 9707.57$

$\sigma_W^2 = (.5\sigma_{X_1})^2 + (.5\sigma_{X_2})^2 = .25\sigma_{X_1}^2 + .25\sigma_{X_2}^2 = 47118457$

$\sqrt{\sigma_W^2} = 6864.28$

(58) $\mu_V = 303.35$ $\sigma_x = 9707.57$

$\sigma_V^2 = (.25\sigma_{X_1})^2 + (.25\sigma_{X_2})^2 + (.25\sigma_{X_3})^3 + (.25\sigma_{X_4})^2$

$.0625\sigma_{X_1}^2 + \cdots$ $= 23559228.83$

$\sqrt{\sigma_V^2} = 4853.79$

(59) Fetch
$\mu = 11$ $\sigma = 2$ (seconds)

Attach
$\mu = 20$ $\sigma = 4$

a) $X = F + A$ $\mu_X = \mu_F + \mu_A = 11 + 20 = 31$ seconds

$\sigma_X^2 = \sigma_F^2 + \sigma_A^2 = 2^2 + 4^2 = 20$ $\sigma_X = \sqrt{20} = 4.4721$ sec.

b) $P(X < 30)$: $\frac{30-31}{4.47} = -.22$ $P(z < -.22) = .4129$

(63) Total
Mean = sum = 224.2 sec. $\sigma_T^2 = 2.8^2 + 3^2 + 2.6^2 + 2.7^2 = 30.89$

$\sigma_T = \sqrt{30.89} = 5.56$ sec.

$P(T < 220)$ $\frac{220 - 224.2}{5.56} = z = -.755$

$P(z < -.755) = .225$

Stats CH 6-3 E 61, 65, 66, 69, 71, 73, 75, 77

(61) $\mu = 1.4$ $\sigma = .3$

$\mu_{x-y} = 0$ $\sigma^2_{x-y} = .3^2 \cdot 2 = .18$

$\sigma_{x-y} = .424$

$x - y = 1.9 - 1.1 = .8$

or $= -.8$

$z = \frac{.8 - 0}{.424} = 1.886$ $P(z \geq 1.886) = .03$

$= -1.886$ $P(z \leq -1.886) = .03$

total: .06

(65) $\mu_c = 110$ $\sigma_c = 10$

$\mu_M = 140$ $\sigma_M = 12$

★ $\frac{1}{2}$ cup $= 70$ $= 6$

$T = C + M$

$\mu_T = 110 + 70 = 180$

(C)

(66) $\sigma_T^2 = 10^2 + 6^2 = 136$ $\sigma_T = \sqrt{136} = 11.66$ (D)

(69) prob $= .85$

Yes

(71) No - not a set number of trials

(73) a) No - Fieldgoals depend on too many factors

b) Yes - $n = 150$ $p = .8$ indep.

(75) $p = .44$ $n = 7$ $x = 4$ $P(x=4) = .2304$ 23%

(77) $P(x > 4) = .1402$ 14%

Stats CH 6-3 F 79, 81, 83, 85, 87, 89

79 $p = .85$ $n = 20$

a) $P(X=17) = .2428$

b) $P(X \le 12) = .0046 + .0013 = .0059$

81 $p = .2$ $n = 15$

a) $\mu_X = 3$

b) $\sigma_X = 1.55$

Expect 3 live give or take 1.55 on average on 15 calls

83 a) $\mu_Y = 12$ $15 - 3 = 12$

if we expect 3 to hit live, the 12 do not ~~expect~~ hit live

b) $\sigma_Y = \sigma_X = 1.55$ they are the same situation with p replaced with $1-p$

85 a) $p = .999$ $n = 350$ X = # of engines operating ok

success = operates 1 hr w/o failure

b) $\mu_X = 349.65$ $\sigma_X = .591$

c) $.043 + .0054 = .0484$ 5% chance of 2 or more failures

seems likely that the prob. is off.

87 76 pass. $\frac{10}{76} = .131$ this is greater than 10% so we can NOT use a binomial dist.

89 If $n > 10\%$ pop. then the amount of change to the makeup of the pop. is too much.

the prob. of success changes too much to be constant.

Stats CH 6-3 G 93, 95, 97, 99, 101-103

93 $p = .477$ $n = 90$ $x = 29$

$P(X \le 29) = .0021$ yes, be suspicious...

95 a) No- not counting trials until 1st success

b) Yes

97 a) $p = .2$ $1-p = .8$

exactly 3: $.8 \cdot .8 \cdot .2 = .128$

b) ~~P(nd 2 X ≤ 9)~~ ~~P(X ≤ 9) = (.8)~~

Need 10 Fails in a row $(.8)^{10} = .1074$

99 $p = \frac{1}{38}$ $\frac{1}{\frac{1}{38}} = 38$ she will expect to take 38 trials to win 1 out of 38.

a)

b) $P(X=1) = \frac{1}{38}$

$P(X=2) = \frac{37}{38} \cdot \frac{1}{38}$

$P(X=3) = \left(\frac{37}{38}\right)^2 \cdot \frac{1}{38}$

Sum = .0769

not totally surprising

101 B

102 C

103 $p = .1$

B

104 C

105 C

AP Review - Book CH6 409-411

(1) B $.3+.1=.4$

(2) D table exp. value: $2.3 \times 3 = 6.9$

(3) E

(4) D $\mu_X = 50$ $\sigma_X = 15$
$\mu_Y = 75$ $\sigma_Y = 22.5$

(5) D $\mu = 10$ $\sigma = 1$
$\times 4 = 40$

(6) D $\sigma^2 = 1$ $1+1+1+1=4$
$\sigma = \sqrt{4} = 2$

(7) C

(8) $p=.4$ $n=17$ $P(X>10) = .035$ (B)

(9) B - used graph binomial Histogram Feature of AP STAT program.

(10) C

(11) a) $.78+.11+.07 = .96$ 96% chance at least 10 are unbroken
b) $0\cdot.78 + 1\cdot.11 + \cdots = .38$ we expect .38 broken in a carton, on ave.
c) $\sigma_Y = .8219$ we expect # broken to vary .8219 from .38 on ave.
d) $1-.78-.11 = .11$ 11% 2 or more are broken
89% 0-1 broken
~~Binomial~~
Find prob that first 3 ~~do~~ not have 2+ broken
$(.89)^3 = .704969$
$1-.704969 = .295$

(12) $p=.66$ $n=12$
a) Y/N, indep., $p=.66$, $n=12$
b) $P(X \le 4) = .02$ 2% chance if 66% is true, prob. NOT TRUE

(13) Ed $\mu_E = 25$ $\sigma_E = 5$ $\sigma_E^2 = 25$ $D = A - E$

a) Ad. $\mu_A = 50$ $\sigma_A = 10$ $\sigma_A^2 = 100$ $\mu_D = 50 - 25 = 25$

$\sigma_D^2 = 25 + 100 = 125$ $\sigma_D = \sqrt{125} = 11.18$

b) $p(D < 0) = .012$ $z = \frac{0 - 25}{11.} = -2.236$

1.2% chance

(14) $p = .13$ $n = 1200$

a) $\mu = 156$ $\sigma = 11.65$

b) 15% of 1200 = 180

$p(x \geq 180) = .02345$

$.0042 + .01925$