Statistics – Prof. Richard B. Goldstein – Brase & Brase – HW Solutions – 9th Ed

Chapter 1

Sect 1.1 #9
(a) Ratio
(b) Interval
(c) Nominal
(d) Ordinal
(e) Ratio
(f) Ratio

Sect 1.2 #13 – I would use 0 or 1 for a, 2 or 3 for b, 4 or 5 for c, 6 or 7 for d, and 8 or 9 for e.

reading from table 1. 92630 79445

produces e, b, d, b, a, d, e, c, c, c

#15
(a) Simple random
(b) cluster
(c) convenience
(d) systematic
(e) stratified

Sect 1.3 #4
(a) Sampling
(b) Simulation
(c) census
(d) experiment

Chapter 2

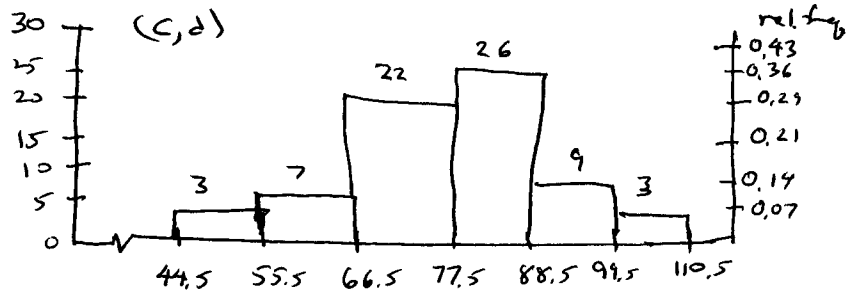
Sect 2.1 #8 (a) low = 45
high = 109

$\frac{109 - 45}{64} + 1 = 65/6 = 10.83 \Rightarrow$ 11 Class width

(b)

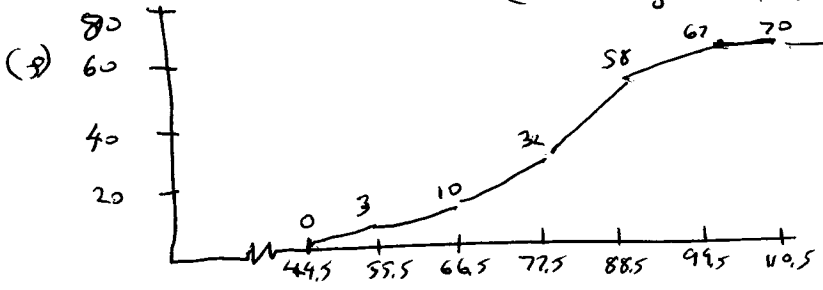
class	freq
45-55	3
56-66	7
67-77	22
78-88	26
89-99	9
100-110	3

(c,d)



(e) single mode – mound shaped

(f)



Statistics (2)
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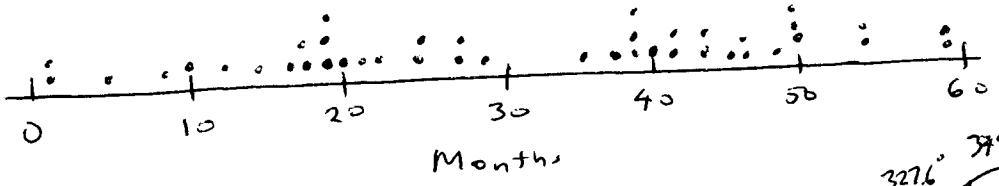
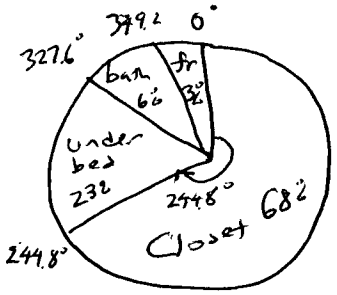
Sect 2.1 #17 (data from #9)

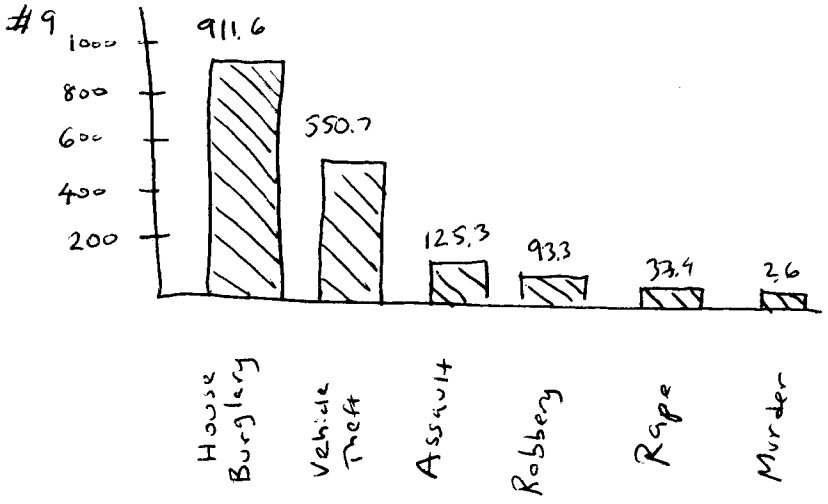


Sect 2.2 #7

68% – closet (.68 × 360 = 244.8°)
23% – under-bed 82.8°
6% – bathtub 21.6°
3% – freezer 10.8°



#9



Sect 2.3 #3

5	2																(= 5.2 days)
5	2	3	5	5	6	7											
6	0	2	4	6	6	7	7	8	8	8	8	9	9				
7	0	0	0	0	0	0	1	1	1	2	2	2	3	3	3	3	4	4
		5	5	6	6	8											
8	4	5	7														
9	4	6	9														
10	0	3															
11	1																

Chapter 3

Sect 3.1 #7

data 2, 2, 3, 6, 10 ($n = 5$) $\frac{n+1}{2} = 3$ $\frac{2+2+3+6+10}{5} = 4.6$

(a) mode = 2 (most frequent), median = 3 ($x_{(3)}$), mean = $\bar{x}$ = 4.6

(b) new data 10, 10, 15, 30, 30 ⇒ mode = 10, median = 15, mean = 23

(c) each measure is five times larger

(d) mode = 2.54 (70) = 177.8 cm
median = 2.54 (68) = 172.72 cm
mean = 2.54 (71) = 180.34 cm

Sect 3.1 #14

$$\text{Wt Avg} = 0.25(92) + 0.225(81+93) + 0.30(85)$$
$$= 23 + 39.15 + 25.5 = \boxed{87.65}$$

Sect 3.2 #7 data 5, 9, 10, 11, 15

(a) $\sum x_i = 50$ $\sum x_i^2 = 5^2 + 9^2 + \dots + 15^2 = 552$ $n = 5$

$$s^2 = \frac{552 - (50)^2/5}{5-1} = \frac{52}{4} = 13 \Rightarrow s = \sqrt{13} = \underline{3.606}$$

(b) new data 25, 45, 50, 55, 75

$\sum x_i = 250$ $\sum x_i^2 = 13,800$

$$s^2 = \frac{13800 - (250)^2/5}{5-1} = \frac{1300}{4} = 325 \Rightarrow s = \sqrt{325} = 18.028$$

(c) the standard deviation is five times as large

(d) $s = 3.1$ mi $= 3.1(1.6)$ Km ≈ 4.96 Km

#12 (a) $\sum x = 284.95$, $\sum x^2 = 7,046.80$, $n = 14$

$\sum y = 421.5$, $\sum y^2 = 14,562.29$, $n = 15$

(b) Grid E $\bar{x} = \frac{284.95}{14} = \underline{20.35}$, $s_x^2 = \frac{7,046.80 - \frac{(284.95)^2}{14}}{13} = \underline{95.93}$ $s_x = \underline{9.79}$

Grid H $\bar{y} = \frac{421.5}{15} = \underline{28.1}$, $s_y^2 = \frac{14,562.29 - 15(28.1)^2}{14} = \underline{194.15}$, $s_y = \underline{13.93}$

(c) $\bar{x} \pm 2s_x$: $20.35 \pm 2(9.79) \Rightarrow$ 0.77 to 39.93

$\bar{y} \pm 2s_y$: $28.10 \pm 2(13.93) \Rightarrow$ 0.24 to 55.96

(d) $CV_x = \frac{9.79}{20.35} = 0.481 \sim 48.1\%$

$CV_y = \frac{13.93}{28.1} = 0.496 \sim 49.6\%$

Grid H has slightly greater variability per expected signal.

#19

profit as % of assets (midpt)	10.55 (8.6–12.5)	14.55 (12.6–16.5)	18.55 (16.6–20.5)	22.55 (20.6–24.5)	26.55 (24.6–28.5)	
# of companies	15	20	5	7	3	= 50

$$\bar{x} = \frac{\sum xf}{\sum f} = \frac{\sum xf}{n} = \frac{10.55(15) + 14.55(20) + \dots + 26.55(3)}{50} = \frac{779.5}{50} = \underline{15.59}$$

$$s^2 = \frac{\sum x^2 f - \frac{(\sum xf)^2}{n}}{n-1} = \frac{13,298.33 - \frac{(779.5)^2}{50}}{49} = \frac{1145.925}{49} = 23.386 \qquad s = \underline{4.836}$$

Sect 3.3 #5 $n=20$

data: 2, 5, 7, 8, 8, 11, 12, 14, 20, 23, 23, 25, 26, 27, 28, 29, 31, 36, 36, 42

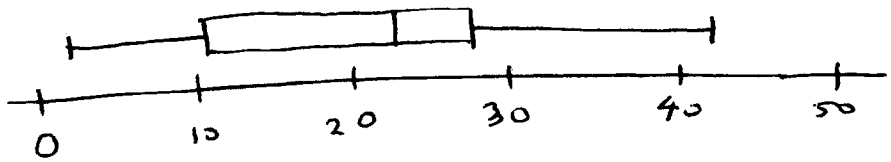
$L = x_{(1)} = 2$, $H = x_{(n)} = 42$ median $= p_{50} = x_{\left(\frac{20+1}{2}\right)} = x_{(10.5)} = \frac{x_{(10)}+x_{(11)}}{2} = \frac{23+23}{2} = 23$

$Q_1 = p_{25} = x_{[1+0.25(20-1)]} = x_{(5.75)} = x_{(5)} + 0.75(x_{(6)} - x_{(5)}) = 8 + 0.75(11-8) = 10.25$

or $Q_1 = p_{25} = x_{(0.25)(20+1)} = x_{(5.25)} = x_{(5)} + 0.25(x_{(6)} - x_{(5)}) = 8 + 0.25(11-8) = 8.75$

$Q_3 = p_{75} = x_{[1+0.75(20-1)]} = x_{(15.25)} = 28 + 0.25(29-28) = 28.25$

or $Q_3 = p_{75} = x_{0.75(20+1)} = x_{(15.75)} = 28 + 0.75(29-28) = 28.75$



(using 1st option)

#10 $n=24$ $L = x_{(1)} = 4, \ldots, x_{(24)} = 80 = H$ $x_{(2)} = 50$ ← lowest within 1st fence

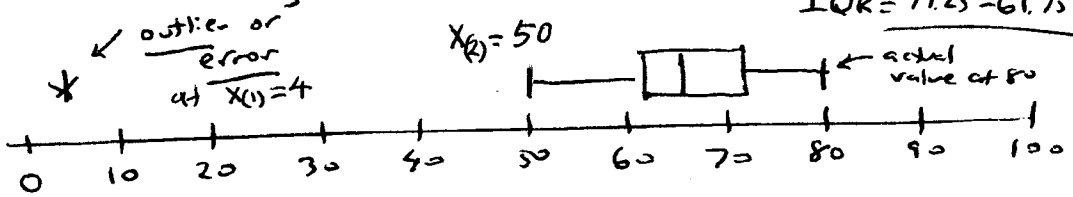
$\tilde{x} = p_{50} = x_{\left(\frac{24+1}{2}\right)} = x_{(12.5)} = \frac{65+66}{2} = 65.5$

Using method I (used by Excel)

$Q_1 = p_{25} = x_{(1+0.25(24-1))} = x_{(6.75)} = 61 + 0.75(62-61) = 61.75$

$Q_3 = p_{75} = x_{(1+0.75(24-1))} = x_{(18.25)} = 71 + 0.25(72-71) = 71.25$

$IQR = 71.25 - 61.75 = 9.5$



first set of fences:

Lower Limit $= Q_1 - 1.5(IQR) = 61.75 - 1.5(9.5) = 47.5$

Upper Limit $= Q_3 + 1.5(IQR) = 71.25 + 1.5(9.5) = 85.5$ (no outliers here)

second set of fences:

$Q_1 - 3(IQR) = 61.75 - 3(9.5) = 33.25$

$Q_3 + 3(IQR) = 71.25 + 3(9.5) = 99.75$

$x_{(1)} = 4$ is an extreme outlier

Chapter 4

Sect 4.1 #1

Probability theoretical $P(A) = \frac{n(A)}{n(S)}$ Sample spaces

experimental $P(A) = \frac{\#\text{ successes of } A}{\#\text{ of trials}}$

subjective $P(A)$ is estimated by user

#11 $P(6\text{ AM} - \text{noon}) = 290/966 = 0.300$
$P(\text{noon} - 6\text{ PM}) = 135/966 = 0.140$
$P(6\text{ PM} - \text{midnt.}) = 319/966 = 0.330$
$P(\text{midnt} - 6\text{ AM}) = 222/966 = 0.230$ / 1.000

Sect 4.2

#7 (a) $P\{\text{green or blue}\} = 0.10 + 0.10 = 0.20$ yes they are mut. excl.

(b) $P\{\text{yellow or red}\} = 0.20 + 0.20 = 0.40$ yes " " " "

(c) $P\{\text{not purple}\} = 1 - 0.20 = 0.80$

#11 (a) $P(\text{sum} = 6) = \frac{5}{36}$

(b) $P(\text{sum} = 4) = \frac{3}{36} = \frac{1}{12}$ yes, they are

(c) $P(\text{sum} = 6 \text{ or sum} = 4) = \frac{5+3}{36} = \frac{8}{36} = \frac{2}{9}$ mutually exclusive

(a) not independent

#13 (b) $P(A \text{ is } 1^{st} \wedge K \text{ is } 2^{nd}) = \frac{4}{52} \cdot \frac{4}{51} = \frac{4}{663}$

(c) $P(K \text{ is } 1^{st} \wedge A \text{ is } 2^{nd}) = \frac{4}{52} \cdot \frac{4}{51} = \frac{4}{663}$

(d) $P(A \text{ and } K \text{ in either order}) = \frac{4}{663} + \frac{4}{663} = \frac{8}{663}$

#19 $P(+ \mid \text{liar}) = 0.72$

$P(+ \mid \text{not a liar}) = 0.07$

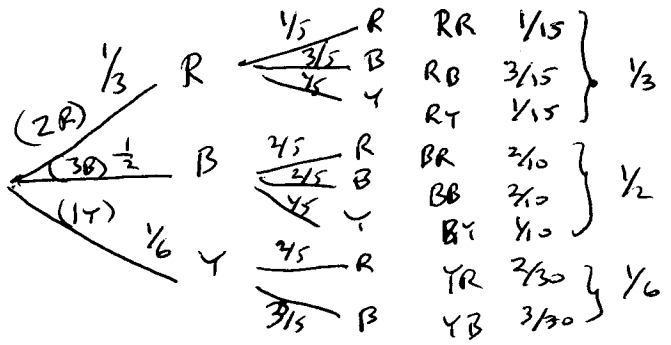
(a) Percentage are wrongly indicated as lies $0.9 \times 0.07 = 0.063 = 6.3\%$

(b) $0.1 \times 0.72 = 0.072 = 7.2\%$

(c) $0.5 \times 0.07 = 3.5\%$ + $0.5 \times 0.72 = 36.0\%$

(d) $0.15 \times 0.07 = 1.05\%$ & $0.85 \times 0.72 = 61.2\%$

Sect 4.3 #7



#9 R G B Y any order $4 \times 3 \times 2 \times 1 = 24$

#14 $P_{8,3} = 8 \times 7 \times 6 = 336$

#18 $C_{8,3} = \frac{P_{8,3}}{3!} = \frac{336}{6} = 56$ or $\left(\frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1}\right)$

#27 6 positions
7 women } 12 people
5 men

(a) $C_{12,6} = \frac{12!}{6!6!} = 924$

(b) $C_{7,6} = \frac{7!}{6!1!} = 7$

(c) $P(\text{all women}) = \frac{7}{924} = 0.008$