Directions

• Compute $\sum An$, $\sum Bn$, $\sum AnBn$, $(\sum An)2$, $(\sum Bn)2$, $\sum An2$, $\sum Bn2$ and $\sum An2Bn2$ • Find the mean, median, mode, range, & standard deviation for An and Bn • Make a stem-and-leaf plot of each set of data for An and $B\blacklozenge$•

1. A= {16, 22, 33, 41, 42, 41, 41, 40, 27, 18}
   B= {12.1, 9.0, 8.3, 9.7, 9.6, 8.4, 11.0, 11.8, 12.8, 12.0}

   $\sum$ An= 16. 18.22. 27.33. .40. 41.41.41.42
   $\sum$ Bn= 8.3, 8.4, 9.0, 9.6, 9.7, 11.0, 11.8, 12.0, 12.1, 12.8
   $\sum$AnBn=16x8.3= 132.8, 18x8.4= 151.2, 22x9.0=200.2, 27x9.6= 259.2,
           33x9.7= 320.1   , 40x11.0=440   , 41x11.8= 483.80   , 41x12.0= 492
           , 41x12.1=496.1   , 42x12.8= 537.6 .
   ($\sum$An)2=16+18+22+27+33+ 40+ 41+41+41+42=(321)2=103,041
   ($\sum$ Bn)2=8.3+ 8.4+ 9.0+ 9.6+9.7+ 11.0+ 11.8+ 12.0+ 12.1+ 12.8=104.7
           (104.7)2= 10,962.09

   $\sum$An2: (16)2= 256 , (18)2=324 ,(22)2=484 ,(27)2= 729 ,(33)2=1089 ,
   (40)2= 1600 ,(41)2=1681 ,(41)2=1681 ,(41)2= 1681 ,(42)2= 1764

   $\sum$ Bn 2: (8.3)2=64, (8.4)2= 70.56   , (9.0)2=81 , (9.6)2=92.16   ,(9.7)2=94.09
           (11.0)2=121, (11.8)2=139.24, (12.0)2= 156 ,
           (12.1)2=146.41   , (12.8)2= 176.64

   $\sum$ An2Bn2:   (256) x (64) =16,384
                   324 x 70.56= 22,861.44
                   484 x 81=   39,204
                   729 x 92.16=67,184.64
                  1089 x 94.09=102,464.01
                  1600 x 121=193,600
                  1681 x 139.24=234,062.44
                  1681 x 156=262,236
                  1681 x 146.41=246,115.21
                  1764 x 176.64=311,592.96
                  _____

                  $\sum$ An2Bn2= 1,495,704.70

   Median: A= 16. 18.22. 27\.<mark>33. .40.</mark> \41.41.41.42

B= 8.3, 8.4, 9.0, 9.6,/ 9.7, 11.0,/ 11.8, 12.0, 12.1, 12.8

Mean is A= 16+18+22+27+33+ 40+ 41+41+41+42=321/ 10=32.10

B= 8.3+ 8.4+ 9.0+ 9.6+9.7+ 11.0+ 11.8+ 12.0+ 12.1+ 12.8=104.7

104.7/10=10.47

Mode A is 41. Mode of B is none

Standard deviation for An and Bn:

A= 16. 18.22. 27.33. .40. 41.41.41.42

$\overline{X}$= 321/10=32.10

$S2= \sum(x1-\overline{X2})2$ $\qquad$ 982.89 $\qquad$ 982.89

-------------- = ---------- = ------------ =**109.21**

N – 1 $\qquad$ 10 – 1 $\qquad$ 9

S2= 109.21

S= 10.4505

Standard deviation is 10.4505

Variance is 109.21

X	$\overline{X}$	(x1- $\overline{X}$)	(x1-$\overline{X}$) 2
16	32.10	-16.10	259.21
18	32.10	- 14.10	198.81
22	32.10	- 10	100
27	32.10	-5.10	26.01
33	32.10	0.9	0.81
40	32.10	7.9	62.41
41	32.10	8.9	79.21
41	32.10	8.9	79.21
41	32.10	8.9	79.21
42	32.10	9.9	98.01
321		0.1	982.89

B= 8.3, 8.4, 9.0, 9.6, 9.7, 11.0, 11.8, 12.0, 12.1, 12.8

X	X	(X1-X)	(X1-X)2
8.3	10.47	-2.17	4.708
8.4	10.47	-2.07	4.28
9.0	10.47	-1.47	2.16
9.6	10.47	-0.87	0.756
9.7	10.47	-0.77	0.592
11.0	10.47	0.53	0.28
11.8	10.47	1.33	1.76
12.0	10.47	1.53.	2.34
12.1	10.47	1.63	2.65
12.8	10.47	2.33	5.48
104.7			**24.99**

$$\frac{104.7}{N} = \frac{104.7}{10} = 10.47$$

$$S2= \frac{\sum(x1-X2)2}{n-1} = \frac{24.99}{10-1} = \frac{24.99}{9} = 2.77$$

Sample Standard **B deviation is (2.77)2= S= 7.69**
B Variance S2 is 2.77

Make a stem-and-leaf plot of each set of data for $An \ and \ B$�•

An's stem & leaf
A= 16. 18.22. 27.33 .40. 41.41.41.42

Stem	Leaf
1	| 6 8
2	| 2 7
3	| 3
4	| 0 1 1 1 2

Bn's stem & leaf

B= 8.3, 8.4, 9.0, 9.6, 9.7, 11.0, 11.8, 12.0, 12.1, 12.8

Stem	leaf
8	|3 4
9	| 0 6 7

```
10   |
11   | 0 8
12   | 1 8
```

2. A= {41, 38, 47, 48, 22, 28, 25, 40, 30} B= {7, 10, 11, 12, 11, 11, 13, 8, 22}

$\sum An$ = 22, 25, 28, 30, 38, 40, 41, 47, 48

$\sum Bn$ = 7,8,10,11,11,11,12,13,22

$\sum AnBn$ = 22x7=154 , 25x8=200,28x10= 280, 30x11=330, 38x11= 418,
              40x11=440, 41x12=492, 47x13=611, 48x22=1056

($\sum An$) 2= (319)2= 101,761

($\sum$ Bn)2= (47)2=2,209

$\sum$An2=   (22)2=484, (25)2=625, (28)2=784, (30)2=900, (38)2=1,444, (40)2=1,600, (41)2=1,681,
          (47)2=2,209, (48)2=2,304

$\sum$Bn2= (7)2= 49,(8)2=64 ,(10)2=100,(11)2=121,(11)2=121,
          (11)2=121,(12)2=144,(13)2=169,(22)2=484

$\sum$ An2Bn2= 484x49=23,716
            625x64=40,000
            784x100=78,400
            900x121=108,900
            1444x121=174,724
            1600x121=193,600
            1681x144=242,064

            2209x169=373,321

            2304x484=1,115,136

        $\sum$ An2Bn2= 2,349,861

Median: $\sum An$= 22, 25, 28, 30, <mark>38</mark>, 40, 41, 47, 48

$\sum Bn$= 7,8,10,11,<mark>11</mark>,11,12,13,22

Mean is A=22+ 25+ 28+ 30+ 38+ 40+ 41+ 47+ 48= 319/9=<mark>35.44</mark>

B= 7+8+10+11+11+11+12+13+22=105/9=<mark>11.66</mark>

Mode of A is <mark>none,</mark> B is <mark>11</mark>

Standard deviation for An and Bn:

A= 22, 25, 28, 30, 38, 40, 41, 47, 48

S2= $\sum$(x1-X2)2   = _24.99_ =   24.99 =   2.77

            n-1

X	$\overline{X}$	(X1- $\overline{X}$)	(X1-$\overline{X}$)2	
22	35.44	- 13.44	180.63	
25	35.44	-10.44	108.99	
28	35.44	- 7.44	55.35	
30	35.44	- 5.44	29.59	
38	35.44	2.56	6.55	
40	35.44	4.56	20.79	
41	35.44	5.56	30.91	
47	35.44	11.56	133.63	
48	35.44	12.56	157.75	

319   724.29

$\overline{X}$ = $\sum$Xi _319_ =   35.44

        N   9

S2= $\sum$(x1-X2)2   = _724.29_ =   90.53_

        n-1   9-1

Sample Standard **A deviation is (2.77)2= S= 90.53.**

A Variance S2 is 9.515

- $Bn=$ 7,8,10,11,11,11,12,13,22

X	$\overline{X}$	$(X1-\overline{X})$	$(X1-\overline{X})2$
7	11.66	-1.66	2.75
8	11.66	-3.66	13.39
10	11.66	-1.66	2.75
11	11.66	0.66	0.43
11	11.66	0.66	0.43
11	11.66	0.66	0.43
12	11.66	0.34	0.11
13	11.66	1.34	1.79
22	11.66	10.34	106.91
105			169.47

$\overline{X}$=105/9=11.66

S2= $\dfrac{\sum(x1-X2)2}{n-1}$ = $\dfrac{169.47}{11.66-1}$ = **15.89**

Sample Standard **B deviation is 3.987**

B Variance S2 is 15.89

Make a stem-and-leaf plot of each set of data for $An\ and\ B$

$\sum An=$ 22, 25, 28, 30, 38, 40, 41, 47, 48
$\sum Bn=$ 7,8,10,11,11,11,12,13,22

An Stem and leaf is

Stem	Leaf
2	2 5 8
3	0 8
4	0 1 7 8

Bn Stem and leaf is

Stem	leaf

7
8
1   0 1 2 3
2   2

3.   3. A= {1.6, 2.4, 1.8, 2.3, 1.9, 1.6, 2.0, 3.1, 3.8, 4.1, 4.0, 4.5}
     B= {10.8, 9.7, 6.1, 8.1, 8.3, 8.5, 8.5, 9.2, 9.1, 9.1, 7.2, 6.3}

$\sum A_n$= 1.6, 1.6, 1.8, 1.9 2.0, 2.3, 2.4, 3.1, 3.8, 4.0, 4.1, 4.5

$\sum B_n$= 6.1, 6.3, 7.2, 8.1, 8.3, 8.5, 8.5, 9.1, 9.1,9.2, 9.7, 10.8

$\sum A_n B_n$= 1.6x 6.1=   9.76
          1.6 x 6.3= 10.08
          1.8 x 7.2= 12.96
          1.9 x 8.1= 15.39
          2.0 x 8.3= 16.60
          2.3 x 8.5=19.55
          2.4 x 8.5 =20.40
          3.1 x 9.1= 28.21
          3.8 x 9.1= 34.58
          4.0 x 9.2= 36.80
          4.1 x 9.7=39.77
          4.5 x 10.8= 48.60

$(\sum A_n)$ 2= (33.1)2=   1,095.61
$(\sum B_n)$2= (100.90)2=10,180.81

$\sum A_n$2= (1.6)2=,2.56 , (1.6)2=2.56 ,(1.8)2=3.24 , (1.9)2=3.61   ,
        (2.0)2= 4.0   ,(2.3)2=5.29   ,
        (2.4)2=5.76   , (3.1)2=9.61   , (3.8)2=14.44   , (4.0)2=16   ,

$(4.1)2=16.81$, $(4.5)2=$ 20.25

$\sum Bn2=(6.1)2=37.21$, $(6.3)2=39.69$, $(7.2)2=51.84$, $(8.1)2=65.61$,
$(8.3)2=71.38$,$(8.5)2=72.25$,
$(8.5)2=72.25$, $(9.1)2=82.81$, $(9.1)2=82.81$,$(9.2)2=84.64$
$(9.7)2=94.09$, $(10.8)2=116.64$

$\sum$ An2Bn2= 2.56 x 37.21= 95.25
2.56 x 39.69=101.60
3.24 x 51.84=167.96
3.61 x 65.61=236.85
4.0 x 71.38= 285.52
5.29 x 72.25=382.20
5.76 x 72.25= 416.16
9.61 x 82.81=795.80
14.44 x 82.81=1195.77
16 x 84.64= 1354.24
16.81 x 94.09=1582.59
20.25 x 116.64=2361.96

$\sum$ An2Bn2= 8,972.90

Median A is 1.6, 1.6,   1.8,   1.9 2.0, 2.3, 2.4, 3.1, 3.8, 4.0, 4.1, 4.5

B is 6.1, 6.3, 7.2, 8.1, 8.3, 8.5, 8.5, 9.1, 9.1,9.2, 9.7, 10.8

Mean is A is 1.6+1.6+ 1.8+ 1.9+ 2.0,+2.3+ 2.4+ 3.1+ 3.8+ 4.0+ 4.1+ 4.5=33.1/12=**2.75**

B is 6.1+ 6.3+ 7.2+ 8.1+ 8.3+8.5+8.5+ 9.1+ 9.1+9.2+ 9.7+ 10.8=100.90/12=**8.40**

 Mode of A is 1.6   B is 8.5 & 9.1

Standard deviation for An and Bn:

A is 1.6, 1.6, 1.8, 1.9 2.0, 2.3, 2.4, 3.1, 3.8, 4.0, 4.1, 4.5

X	$\overline{X}$	$(X1 - \overline{X})$	$(Xi - \overline{X})2$	$\overline{}$
1.6	2.76	-1.16	1.34	
1.6	2.76	-1.16	1.34	
1.8	2.76	- 0.96	0.92	
1.9	2.76	-0.86	0.73	
2.0	2.76	- 0.76	0.57	
2.3	2.76	-0.46	0.21	
2.4	2.76	-0.36	0.12	
3.1	2.76	0.34	0.11	
3.8	2.76	1.04	1.08	
4.0	2.76	1.24	1.53	
4.1	2.76	1.34	1.79	
4.5	2.76	1.74	3.02	
33.10			12.76	

$\overline{X}$ = $\dfrac{\sum xi}{N}$ = $\dfrac{33.10}{12}$ = 2.76

$S2 = \dfrac{\sum (x1-X2)2}{n-1}$ = $\dfrac{(12.76)2}{2.76-1}$ = $\dfrac{162.81}{1.76}$ = 92.50

Variance is S2= 92.50
Sample Standard deviation is S=   9.618

B is 6.1, 6.3, 7.2, 8.1, 8.3, 8.5, 8.5, 9.1, 9.1,9.2, 9.7, 10.8

X	$\overline{X}$	$(X_i - \overline{X})$	$(X_i - \overline{X})2$
6.1	8.4	-2.3	5.29
6.3	8.4	-2.1	4.41
7.2	8.4	-1.2	1.44
8.1	8.4	-0.3	0.09
8.3	8.4	-0.1	0.01
8.5	8.4	0.1	0.01
8.5	8.4	0.1	0.01
9.1	8.4	0.7	0.49
9.1	8.4	0.7	0.49
9.2	8.4	0.8	0.64
9.7	8.4	1.3	1.69
10.8	8.4	2.4	5.76
100.90			20.33

S2= $\frac{\sum(x1-X2)2}{n-1}$ = $\frac{(20.33)2}{8.4-1}$ = $\frac{413.30}{7.4}$ = 55.85

Variance is S2= 55.85.
Sample Standard deviation is S=   7.473

Make a stem-and-leaf plot of each set of data for An and B�•

An's stem & leaf

$\sum An$= 1.6, 1.6, 1.8, 1.9 2.0, 2.3, 2.4, 3.1, 3.8, 4.0, 4.1, 4.5

Stem	Leaf
1	6 8 9
2	0 3 4
3	1 8
4	0 1 5

$\sum Bn$= 6.1, 6.3, 7.2, 8.1, 8.3, 8.5, 8.5, 9.1, 9.1,9.2, 9.7, 10.8

```
Stem  | Leaf
6          1   3
7          2
8          1   3   5   5
9          1   1   2   7
10         8
```

4. A= {76, 83, 54, 43, 44, 44, 103, 99, 94, 84}
   B= {8, 12, 14, 11, 11, 15, 9, 21, 25, 27

$\sum An$= 43.44.44. 54.76.83.84.94.99.103
$\sum Bn$= 8,   9,   11, 11,12,14,15,21,25,27

$\sum AnBn$= 43 x 8=   344
             44 x 9=   396
             44 x 11=   484
             54 x 11=   594
             76 x 12=   912
             83 x 14=1,162
             84 x 15=1,260
             94 x 21=1,974
             99 x 25=2,475
             103 x 27=2,781

($\sum$An)2=41+44+44+ 54+76+83+84+94+99+103=(722)2=521,284
($\sum$ Bn)2=8+ 9+ 11+ 11+12+14+15+21+25+27=(154)2=23,716

$\sum$An2: (41)2= 1,681   (44)2= 1,936   (44)2=1,936.   (54)2=2916,
      (76)2= 5,776 (83)2=6,889   (84)2=7,056   (94)2=8,836
       (99)2= 9,801   (103)2=10,609

$\sum$ Bn 2: (8)2=64,   (9)2=81,   (11)2= 121,   (11)2=121,
         (12)2=144,
         (14)2=196, (15)2=225,
         (21)2=441, (25)2=625, (27)2=729

$\sum$ An2Bn2:   1681 x 64=   107,584
              1936 x 81=   156,816
              1936 x 121=   234,256

2916 x 121=   355,752
5776 x 144=   833,184
6889 x 196= 1,352,204
7056 x 225= 1,587,600
8836 x 441= 3,896,676
9801 x 625= 6,125,625
10,609 x 729=7,727,400
_____

$\sum An2Bn2$= 22,377,097

Median: $\sum An$= 43.44.44. 54.76.83.84.94.99.103
        $\sum Bn$= 8,   9, 11, 11,12,14,15,21,25,27

Mean is A= 41+44+44+ 54+76+83+84+94+99+103=722/10=72.20

       B= 8+ 9+ 11+ 11+12+14+15+21+25+27=154/10=15.40

Mode A is 44. Mode of B is 11.

Standard deviation for $An \; and \; Bn$:
 A= 43.44.44. 54.76.83.84.94.99.103

$\overline{X}$= 722/10=72.20

$S2= \frac{\sum(x1-\overline{X2})2}{N-1} = \frac{5186.80}{72.20-1} = 72.84$

Standard deviation is = 8.535
Variance S2 is 72.84

B== 8,   9, 11, 11,12,14,15,21,25,27

X	X	(X1-X2)	(X1-X2)2
8	15.40	123.20	15,178.24
9	15.40	138.60	19,209.96
11	15.40	169.40	28,696.36
11	15.40	169.40	28,696.36
12	15.40	184.80	34,151.04
14	15.40	215.60	46,483.36
15	15.40	231	53,361
21	15.40	323.40	104,587.56
25	15.40	385	148,225
27	15.40	415.80	172,889.64
154			551,478.52

$$S2= \frac{\sum(x1-X2)2}{N-1} = \frac{551478.52}{15.40-1} = 38,297.11$$

Standard deviation is 195.696
Variance S2 is 38,297.11

Make a stem-and-leaf plot of each set of data for $An \ and \ B$�•

$A=$ 43.44.44. 54.76.83.84.94.99.103

Stem and Leaf
Stem | Leaf
_____

4	3 4 4
5	4
7	6
8	3 4
9	4 9
10	3

B= 8,   9,   11, 11,12,14,15,21,25,27

Stem	Leaf
8	
9	
1	1 1 2 4 5
2	1 5 7