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# Chapter 1: Descriptive Statistics

## Solutions to Chapter 1 Prep Questions

1. One reasonable way would be to calculate the average precipitation for each month and then choose the month with the highest average.

## Solutions to Chapter 1 Review Questions

1. a. The mean is the average of the values. It describes the center of the distribution.

b. 
$$\text{Mean}[\mathbf{x}] = \frac{\sum_{t=1}^T x_t}{T}$$

3. A histogram illustrates how the values of a single data variable are distributed.

5. a. Yes.  
b. No.

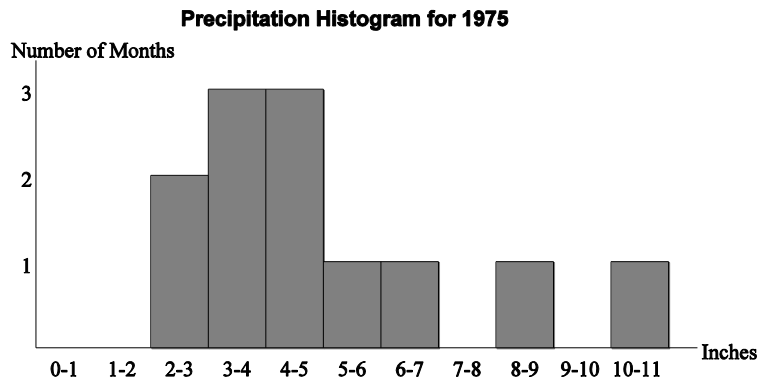
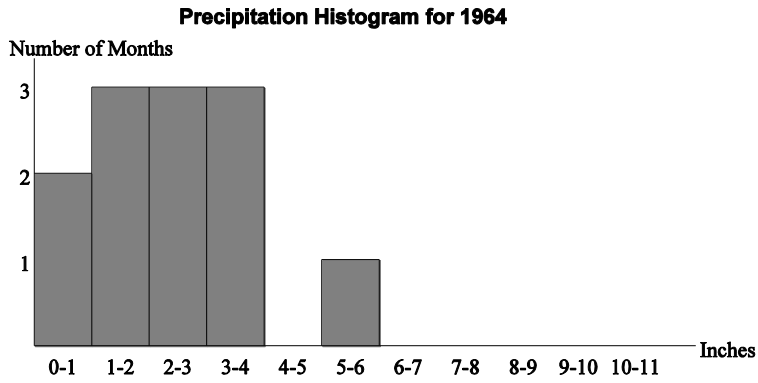
7. a.  $\text{Cov}[\mathbf{x}, \mathbf{y}] > 0$                        $0 < \text{CorrCoef}[\mathbf{x}, \mathbf{y}] \leq 1$   
b.  $\text{Cov}[\mathbf{x}, \mathbf{y}] < 0$                        $-1 \leq \text{CorrCoef}[\mathbf{x}, \mathbf{y}] < 0$   
c.  $\text{Cov}[\mathbf{x}, \mathbf{y}] \approx 0$                        $\text{CorrCoef}[\mathbf{x}, \mathbf{y}] \approx 0$

## Solutions to Chapter 1 Exercises

1. a.

Inches of Precipitation	1964	1975
0–1	2	0
1–2	3	0
2–3	3	2
3–4	3	3
4–5	0	3
5–6	1	1
6–7	0	1
7–8	0	0
8–9	0	1
9–10	0	0
10–11	0	1

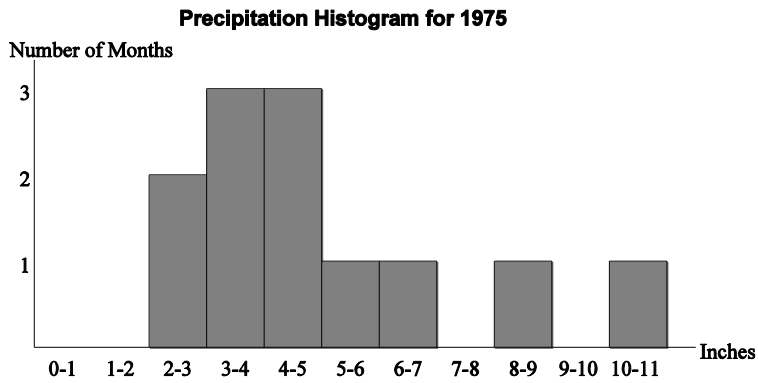
b.

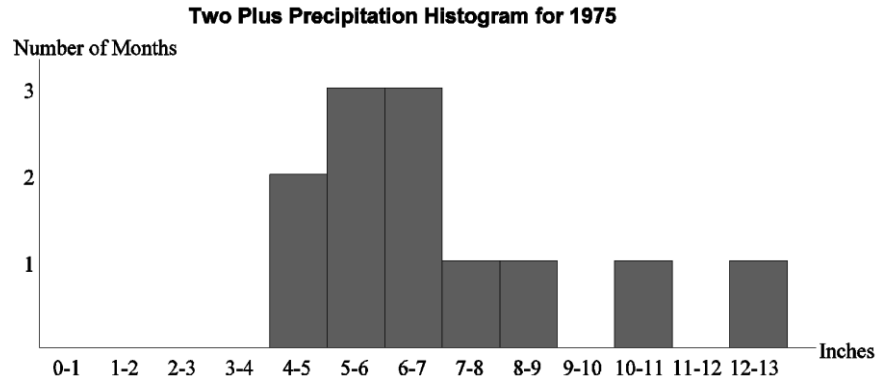


3. a. 1975

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Precip</i>	4.39	3.04	3.97	2.87	2.10	4.68	10.56	6.13	8.63	4.90	5.08	3.90
<i>TwoPlusPrecip</i>	6.39	5.04	5.97	4.87	4.10	6.68	12.56	8.13	10.63	6.90	7.08	5.90

b.

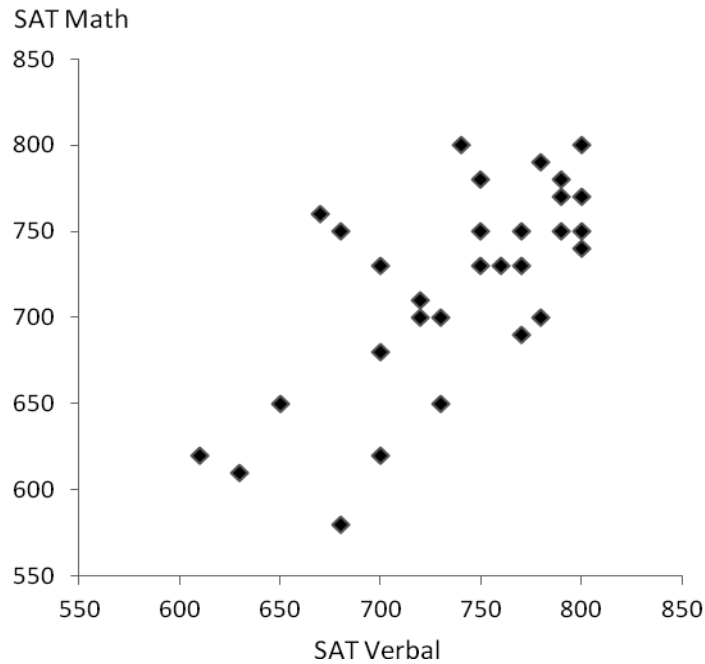




- i. The histograms have identical shape. The *TwoPlusPrecip* histogram is just “slided” 2 inches to the right.
  - ii. The center has risen (shifted to the right) by 2 inches.
  - iii. The spread is unchanged.
- c.
- i.  $\text{Mean}[\textit{TwoPlusPrecip}] = \text{Mean}[2 + \textit{Precip}]$   
 $= 2 + \text{Mean}[\textit{Precip}]$   
 $= 2 + 5.02$   
 $= 7.02$
  - ii.  $\text{Var}[\textit{TwoPlusPrecip}] = \text{Var}[2 + \textit{Precip}]$   
 $= \text{Var}[\textit{Precip}]$   
 $= 5.41$
- d.
- i. 7.02
  - ii. 64.91
  - iii. 5.41
- e. Yes, the answers are consistent. The histogram reveals that the
- center of the *TwoPlusPrecip* distribution is farther to the right; this is consistent with its higher mean.
  - spread of the two distributions is the same; this is consistent with their equal variances.

The appropriate equation and statistical software provide the same answers.

5. a.



b. Yes, *SatMath* and *SatVerbal* appear to be correlated. As *SatVerbal* increases, *SatMath* tends to increase also.

	<i>SatMath</i>	<i>SatVerbal</i>
Mean	737.0	719.0
Variance	2,774.3	3,402.3
Covariance	2,103.7	
Correlation Coefficient	.6847	

d. i.  $\text{Mean}[\mathbf{SatSum}] = \text{Mean}[\mathbf{SatMath}] + \text{Mean}[\mathbf{SatVerbal}]$   
 $= 737.0 + 719.0$   
 $= 1,456.0$

ii.  $\text{Var}[\mathbf{SatSum}] = \text{Var}[\mathbf{SatMath}] + 2\text{Cov}[\mathbf{SatMath}, \mathbf{SatVerbal}] + \text{Var}[\mathbf{SatVerbal}]$   
 $= 2,774.3 + 2 \times 2,103.7 + 3,402.3$   
 $= 10,384.0$

- e. i. 1,456.0  
 ii. 311,520  
 iii. 10,384.0

f. Yes

7. a.  $\text{Mean}[\mathbf{SatMath}] = \frac{x_1 + x_2 + \dots + x_{30}}{30}$   
 $= \frac{x_1 + x_2 + \dots + x_{10} + x_{11} + x_{12} + \dots + x_{30}}{30}$   
 $= \frac{x_1 + x_2 + \dots + x_{10}}{30} + \frac{x_{11} + x_{12} + \dots + x_{30}}{30}$

