

1. Height (in)	Frequency, f	Midpoint, x	x f
70-71	1	70.5	70.5
72-73	8	72.5	580
74-75	13	74.5	968.5
76-77	8	76.5	612
78-79	15	78.5	1177.5
80-81	6	80.5	483
82-83	3	82.5	247.5
Totals	54		4139

$$\text{Mean} = \frac{\sum xf}{\sum x} = \frac{4139}{54} = 76.6$$

2. Mean, $\mu = -2.91$
 std, $\sigma = 3.88$
 $x = 2.8$

$$Z\text{-score} = \frac{x - \mu}{\sigma} = \frac{2.8 - (-2.91)}{3.88}$$

$$= 1.47$$

3. Variance

1.4, 0.99, 1.37, 0.58, 0.68, 0.57, 1.1, 0.96, 1.2, 1.27

$$\text{Mean} = \frac{1.4 + 0.99 + 1.37 + 0.58 + 0.68 + 0.57 + 1.1 + 0.96 + 1.2 + 1.27}{10}$$

$$\bar{x} = 1.012$$

$$s^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$$

x	$x - \bar{x}$	$(x - \bar{x})^2$
1.4	0.388	0.1505
0.99	-0.022	0.0005
1.37	0.358	0.1282
0.58	-0.432	0.1866
0.68	-0.332	0.1102
0.57	-0.442	0.1954
1.1	0.088	0.0077
0.96	-0.052	0.0032
1.2	0.188	0.0354
1.27	0.258	0.0666
Total		0.8843

$$s^2 = \frac{1}{10-1} (0.8843)$$

$$= 0.098$$

4. Mode for the sample data

Most common data

$$\text{Mode} = 41.4, 41.8, 43.7$$

5. Range for the sample data

$$\begin{aligned}\text{Range} &= \text{Maximum} - \text{Minimum} \\ &= 606 - 116 \\ &= 490\end{aligned}$$

6. Standard deviation for the sample data.

Mean, $\bar{x} = 44$

X	$x - \bar{x}$	$(x - \bar{x})^2$
2	-42	1764
3	-41	1681
6	-38	1225 1444
17	-27	729
22	-22	484
40	-4	16
54	10	100
73	29	841
101	57	3249
122	78	6084
Total		16392

$$S = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2}$$

$$= \sqrt{\frac{1}{9} (16392)}$$

$$= 42.7$$

7.

Let $P(X \geq 12) = P(A)$
 $P(8 \leq X \leq 15) = P(B)$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Total = 43

$$P(A) = \frac{4+4+2+2}{43} = \frac{12}{43}$$

$$P(B) = \frac{12+4}{43} = \frac{16}{43}$$

$$P(A \cap B) = \frac{4}{43}$$

$$P(A \text{ or } B) = \frac{12}{43} + \frac{16}{43} - \frac{4}{43} = \frac{24}{43}$$

8

	Positive	Negative	
Disease	111	4	115
No disease	11	172	183
Total	122	176	298

$$P(D/Negative) = \frac{P(Disease \cap Negative)}{P(Negative)}$$

$$= \frac{4}{176} = \frac{1}{44}$$

9.

	cola	root beer	lemon-lime	
< 21	40	25	20	85
21 - 40	35	20	30	85
40 >	20	30	35	85
Total	95	85	85	255

$$P(\text{Over 40} / \text{root beer}) = \frac{P(\text{Over 40} \cap \text{root beer})}{P(\text{root beer})}$$

$$= \frac{30}{85} = \frac{2}{5}$$

$$10. P(\text{face card}) = \frac{12}{52}$$

$$P(\text{Hearts}) = \frac{13}{52}$$

$$P(\text{face and hearts}) = \frac{3}{52}$$

$$P(\text{face or hearts}) = \frac{12}{52} + \frac{13}{52} - \frac{3}{52} = \frac{22}{52} = \frac{11}{26}$$

11

$$\text{Expected value} = \frac{1}{36}(85) + \frac{35}{36}(-4)$$

$$= -1.528$$

$$\approx -1.53 \text{ dollars}$$

12 $n = 12$

$x = 3$

$p = \frac{1}{5} = 0.2 \quad q = 1 - 0.2 = 0.8$

$P(X=3) = {}^nC_x p^x q^{n-x}$

$$= {}^{12}C_3 (0.2)^3 (0.8)^9$$

$$= 0.236$$

13 $p = 0.22$

$n = 16$

$$\text{Mean, } \mu = np = 0.22 \times 16$$

$$= 3.52$$

14. $n = 11$

$x = 3$

$p = 0.2$

$q = 0.8$

$$P(X \leq 3) = P(X=0) + P(X=1) + P(X=2) + P(X=3)$$

$$= \binom{11}{0} 0.2^0 (0.8)^{11} + \binom{11}{1} (0.2)^1 (0.8)^{10} + \binom{11}{2} (0.2)^2 (0.8)^9 + \binom{11}{3} (0.2)^3 (0.8)^8$$

$$= 0.8389$$

$$= 0.839$$

15 $\mu = 73$

$\sigma = 7.8$

$n = 24$

$\bar{x} = 70$

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{70 - 73}{\frac{7.8}{\sqrt{24}}} = -1.88$$

$$P(X < 70) = P(Z < -1.88) = 0.0301$$

$$16. P(-1.56 < Z < 1.56)$$

$$P(Z < 1.56) = 0.9406$$

$$P(Z < -1.56) = 0.0594$$

$$= 0.9406 - 0.0594$$

$$= 0.8812$$

$$17. \mu = 12$$

$$\sigma = 0.12$$

$$\bar{X} = 12.06$$

$$Z = \frac{12.06 - 12}{0.12} = 0.5$$

$$P(Z \geq 0.5) = \cancel{0.6915} \quad 0.3085$$

$$\begin{aligned}
 18. \quad \mu &= 12 \\
 \sigma &= 0.12 \\
 n &= 36 \\
 X &= 12.06
 \end{aligned}$$

$$Z = \frac{12.06 - 12}{\frac{0.12}{\sqrt{36}}} = 3$$

$$P(Z > 3) = 0.0013$$

$$19. \quad n = 38, \quad p = \frac{3}{5}$$

$$\mu = np = 38 \times \frac{3}{5} = 22.8$$

$$20. \quad n = 5, \quad X = 2, \quad p = 0.7, \quad q = 0.3$$

$$P(X=3) = \binom{5}{2} (0.7)^2 (0.3)^3 = 0.1323$$