

PART 1

1. B
2. A
3. B
4. C
5. C
6. C
7. D
8. B
9. A
10. A
11. B
12. B
13. A
14. C
15. B
16. A
17. B
18. A
19. B
20. A

PART 2

- I. The National Team Home Runs appears to be approximately symmetric while that of American League is negatively skewed.
American League Home Runs scores are higher than that of National League

II.

	Laptop	No Laptop	Total
A	365	156	521
B	408	71	479
Total	773	227	1000

$$(a) P(\text{Laptop}) = \frac{773}{1000} = 0.773$$

$$(b) P(B|\text{Laptop}) = \frac{P(B \text{ and Laptop})}{P(\text{Laptop})} = \frac{408}{773} = 0.528$$

(c) No. They can occur at the same time ($P(B \text{ and Laptop}) \neq 0$)

(d) They are not independent
 $P(B \text{ and Laptop}) \neq P(B) \cdot P(\text{Laptop})$

$$\text{III. } n = 40 \quad p = 0.38 \quad \alpha = 0.1$$

$$\hat{p} = \frac{x}{n} = \frac{22}{40} = 0.55$$

$$H_0: p = 0.38$$

$$H_1: p > 0.38$$

Conditions

(i) The data is simple random sample

$$(ii) np \geq 10, np(1-p) \geq 10$$

(iii) There are possible two outcomes

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{0.55 - 0.38}{\sqrt{\frac{0.38(1-0.38)}{40}}} = 2.22$$

$$P\text{-value} = 0.0134$$

Reject H_0 since $p\text{-value} < 0.1$. There is sufficient evidence to support the claim that Sue made a significant improvement in her free throw shooting.

(a) Since the true proportion lies between 0.449 and 0.55, this supports the above conclusion.

IV (a) Because the data is positively skewed.

$$(b) \quad n = 30 \quad \sigma = 7510$$

$$\mu = 30000 \quad \bar{x} = 28000$$

$$P(\bar{x} < 28000)$$

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{28000 - 30000}{\frac{7510}{\sqrt{30}}} = -1.46$$

$$P(z < -1.46) = 0.0723$$

V. $p = 0.92$, $n = 50$

- (a) (i) Each trial results in one of two outcomes, failure and success.
 (ii) The probability of success is the same from trial to trial.
 (iii) The trials are independent
 (iv) There are fixed number of trials.

(b) $P(X < 45)$

$$P(X=x) = \binom{n}{x} p^x (1-p)^{n-x}$$

$$P(X < 45) = 1 - (P(X=45) + P(X=46) + P(X=47) + P(X=48) + P(X=49) + P(X=50))$$

$$= 1 - (0.1629 + 0.2037 + 0.1993 + 0.1433 + 0.0672 + 0.0155)$$

$$= 0.2081$$

(c) $E(X) = \mu = np = 50 \times 0.92 = 46$

$$\sigma = \sqrt{np(1-p)} = \sqrt{50 \times 0.92(1-0.92)} = 1.918$$

(i) In the long run you will expect an average of 46 seedlings.

(ii) The variability of possible outcomes is 1.918.

(d) For it to follow Normal distribution: $np \geq 5$, $nq \geq 5$

$$np = 50 \times 0.92 = 46 > 5$$

$$nq = 50 \times 0.08 = 4 < 5$$

VI. $n = 151$, $\bar{x} = 7.7$, $s = 1.4$

(a) The mean sleep time considered a good night's sleep.

$$H_0: \mu = 8$$

$$H_1: \mu < 8$$

(b) Reject H_0 since $p\text{-value} < 0.05$. There is sufficient evidence to conclude that the average sleep time for postpartum women do not get enough sleep.

(c) Type II error. This means that we will conclude postpartum women get enough sleep when they do not.

VII. $n = 50$, $\bar{X} = 4.58$, $S = 1.10$

(a) $t_{\alpha/2} = 1.677$

$$C.I = \bar{X} \pm t_{\alpha/2} \left(\frac{S}{\sqrt{n}} \right)$$

$$= 4.58 \pm 1.677 \left(\frac{1.1}{\sqrt{50}} \right)$$

$$= 4.58 \pm 0.261$$

$$= (4.319, 4.841)$$

(b) Yes. The interval contains values greater than 4 years.

VIII. (a) The scatterplot shows negative linear relationship. As the atmospheric pressure increases, the wind speed decreases.

(b) When the atmospheric pressure increases by one unit, the wind speed decreases by 1.199

$$(c) \hat{y} = 1245.9405 - 1.199(\overset{982}{55}) = \cancel{1179.9955} \text{ mb}$$

$$= 68.5225$$

$$\text{Residual} = \text{Observed} - \text{Predicted}$$

$$= 55 - 68.5225 = -13.5225$$