

1.

***t*-test:**

$$H_0: \mu = 60 \text{ min}$$

$$H_1: \mu < 60 \text{ min}$$

$$\alpha = 0.05$$

$$n = 24$$

$$\bar{x} = 57.79$$

$$s = 6.580$$

$$s_{\bar{x}} = 1.343$$

$$t = -1.644$$

$$df = 23$$

$$p = 0.057$$

Since $p = 0.057 > \alpha = 0.05$, we fail to reject the null hypothesis and conclude that there isn't sufficient evidence to support the manufacturer's claim.

2.

χ^2 -test:

H_0 : The satisfaction proportions are the same for each boss/employee gender relation

H_1 : There is a difference between satisfaction proportions between different boss/employee gender relations

$\alpha = 0.05$

$df = (3 - 1)(4 - 1) = 6$

	F/M	F/F	M/M	M/F	All
	21	25	54	71	
Satisfied	34.81 5.480	46.67 10.063	43.61 2.475	45.91 13.717	171
Neutral	39 35.83 0.280	49 48.04 0.019	50 44.89 0.583	38 47.25 1.810	176
Dissatisfied	31 20.36 5.563	48 27.29 15.710	10 25.50 9.424	11 26.85 9.353	100
All	91	122	114	120	447

Cell format:

Observed

Expected

$$\chi^2 = \frac{(O - E)^2}{E}$$

Total $\chi^2(6) = 74.48$

$p < 0.001$

Since $p < 0.001 < \alpha = 0.05$, we reject the null hypothesis and conclude that the boss/employee gender relation does have a significant effect on the level of job satisfaction.

3.

Paired t -test:

$H_0: \mu_d = 0$ (the population mean difference between pairs is zero)

$H_1: \mu_d \neq 0$ (the population mean difference between pairs is different from zero)

$$\alpha = 0.05$$

$$df = 25 - 1 = 24$$

Difference between pairs:

$$\bar{d} = -0.720$$

$$s = 3.195$$

$$s_{\bar{d}} = 0.639$$

$$t = -1.13$$

$$p = 0.271$$

Since $p = 0.271 > \alpha = 0.05$, we fail to reject the null hypothesis and conclude that sex is not a factor in salary.

4.

$$S \sim N(2.5, 0.3^2)$$

(a)

$$P(S > 3)$$

$$= P\left(Z > \frac{3 - 2.5}{0.3}\right)$$

$$= P(Z > 1.667)$$

$$= 1 - \Phi(1.667)$$

$$= 1 - 0.9522$$

$$= \mathbf{0.0478}$$

(b)

$$P(|S - \mu| \leq 0.15)$$

$$= P\left(|Z| \leq \frac{0.15}{0.3}\right)$$

$$= P(-0.5 \leq Z < 0.5)$$

$$= 2\Phi(0.5) - 1$$

$$= 2(0.6915) - 1$$

$$= \mathbf{0.3829}$$

(c)

$$P(S > 1.8)$$

$$= P\left(Z > \frac{1.8 - 2.5}{0.3}\right)$$

$$= P(Z > -2.333)$$

$$= 1 - \Phi(2.333)$$

$$= 1 - 0.00982$$

$$= \mathbf{0.9902}$$

(d)

$$P(Z > z) = 0.09$$

$$P(Z \leq z) = 1 - 0.09 = 0.91$$

$$z = \Phi^{-1}(0.91)$$

$$z = 1.3408$$

$$x = \mu + z\sigma = 2.5 + 1.3408(0.3) = 2.90$$

\$2.9 million

χ^2 -test:

H_0 : The ratio of White : Black : Hispanic employees is the same as 70:12:18

H_1 : The ratio of White : Black : Hispanic employees is different from 70:12:18

$\alpha = 0.05$

$df = 3 - 1 = 2$

	Whites	Blacks	Hispanics
Expected	140	24	36
Observed	165	14	21
$\frac{\Sigma(O - E)^2}{E}$	4.464	4.167	6.25

Total $\chi^2(2) = 14.88$

$p = 0.00059$

Since $p = 0.00059 < \alpha = 0.05$, we reject the null hypothesis and conclude the ratio of employees by race is different from the ratio in the local population. There seems to be strong evidence that the company does engage in prejudicial hiring practices.

6.

Independent samples t -test:

$H_0: \mu_d - \mu_b = 0$ (the difference between population means for before and during is zero)

$H_1: \mu_d - \mu_b > 0$ (the difference between population means for before and during is greater than zero)

$$\alpha = 0.05$$

$$df = 10 + 10 - 2 = 18$$

For Before:

$$\bar{b} = 58.70$$

$$s_b = 5.58$$

$$s_{\bar{b}} = 1.8$$

For During:

$$\bar{b} = 58.70$$

$$s_b = 5.58$$

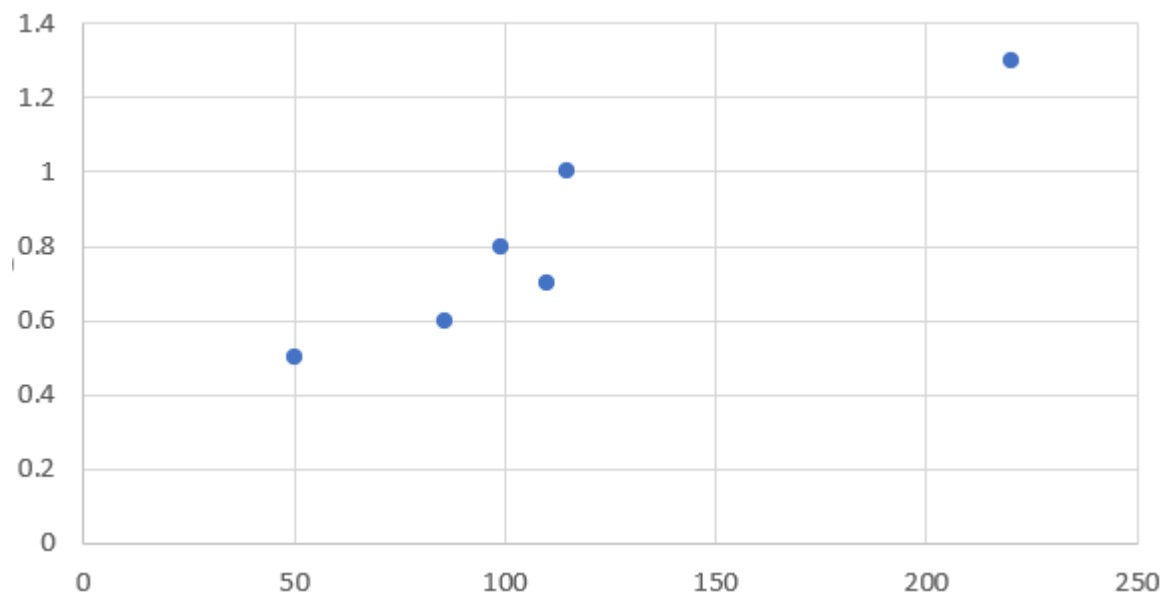
$$s_{\bar{b}} = 1.8$$

$$t = 3.78$$

$$p = 0.001$$

Since $p = 0.001 < \alpha = 0.05$, we reject the null hypothesis and conclude that the since the sales during the campaign are larger than before, the advertising campaign was successful.

7.



$$\Sigma x = 680$$

$$SS_x = 16355.333$$

$$\Sigma y = 4.9$$

$$SS_y = 0.428$$

$$SS_{xy} = 78.467$$

$$r = \frac{SS_{xy}}{\sqrt{SS_x \cdot SS_y}} = 0.9375$$

$$r^2 = 0.8789$$

The coefficient of determination is 0.8789, which means that 87.9% of variation in y can be explained by variation in x .

$$p = 0.0057$$

Since $p = 0.0057 < 0.05$, we reject the null hypothesis in favor of the correlation coefficient being significant. We conclude that there is significant relationship between the variables.

8.

Items	Frequency
6	2
8	1
9	1
10	1
11	1
12	1
14	1
16	2
17	2
18	1
19	3
20	1
21	3
22	1
24	1
25	2
29	1

9.

(a)

$$\hat{y} = -0.2268 + 2.794x$$

(b)

$$\hat{y} = -0.2268 + 2.794(0.275) = \mathbf{0.542}$$

(c)

$$r^2 = 0.1931$$

19.31% of variation in winning percentage is explained by variation in batting averages.

10.

Independent samples t -test:

$H_0: \mu_h - \mu_u = 0$ (there is no difference between population means for salaries of high school and undergraduates)

$H_1: \mu_h - \mu_u \neq 0$ (there is a difference between population means for salaries of high school and undergraduates) $\alpha = 0.05$

$$df = 7 + 9 - 2 = 14$$

For High School:

$$\bar{h} = 49.0$$

$$s_h = 7.81$$

$$s_{\bar{h}} = 3.0$$

For Undergraduate:

$$\bar{u} = 74.7$$

$$s_u = 15.3$$

$$s_{\bar{u}} = 5.1$$

$$t = -4.35$$

$$p = 0.001$$

Since $p = 0.001 < \alpha = 0.05$, we reject the null hypothesis and conclude that there is a significant difference between salaries of high school graduates and undergraduates degree holders.