(1) $H_0: \mu = 8.4$

claim → $H_1: \mu > 8.4$

$\alpha = 0.05$ (our choice)

✓ Claim
✓ Data
✓ α
✓ TS
✓ PV, CV
✓ Con

SAMPLE DATA

$n = 28$ $\quad df = 27$

$\bar{x} = 9.7$

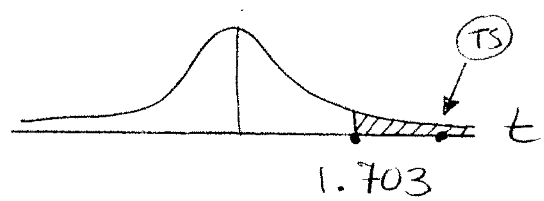
$s = 2.6$

TEST STATISTIC

$$t = \frac{\bar{x} - \mu_{\bar{x}}}{\frac{s}{\sqrt{n}}} \qquad t = \frac{9.7 - 8.4}{\frac{2.6}{\sqrt{28}}} \approx \boxed{2.65}$$

P-Value $\approx \boxed{0.007}$

CRITICAL VALUE



P-Value < α

TS IS IN CRITICAL REGION

$\boxed{\text{REJECT } H_0}$

There is sufficient evidence to support the claim that card usage increased during the promotional period.

We have concluded that card usage increased during the promotional period so yes, we do have statistically significant support to continue the promotion.

(2)

(a) $\hat{p} - E < p < \hat{p} + E$

$E = Z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}\hat{q}}{n}}$

Sample Data

$n = 250$

$x = 175$

$\hat{p} = \frac{175}{250} = 0.7$

99% C.I.

$\alpha = 0.01$

$\alpha/2 = 0.005$

use 1 Prop Z Int...

$0.7 - E < p < 0.7 + E$

$E = (2.576)\sqrt{\frac{(.7)(.3)}{250}}$

$E \approx 0.075$

$0.7 - .075 < p < 0.7 + .075$

$$\boxed{0.625 < p < 0.775}$$

we are 99% confident that the true population proportion is between 0.625 and 0.775.

(b) $n = \left(Z_{\frac{\alpha}{2}}\right)^2 \cdot \frac{\hat{p}\hat{q}}{E^2}$

for a 99% CI $\alpha = 0.01$

$\alpha/2 = 0.005$

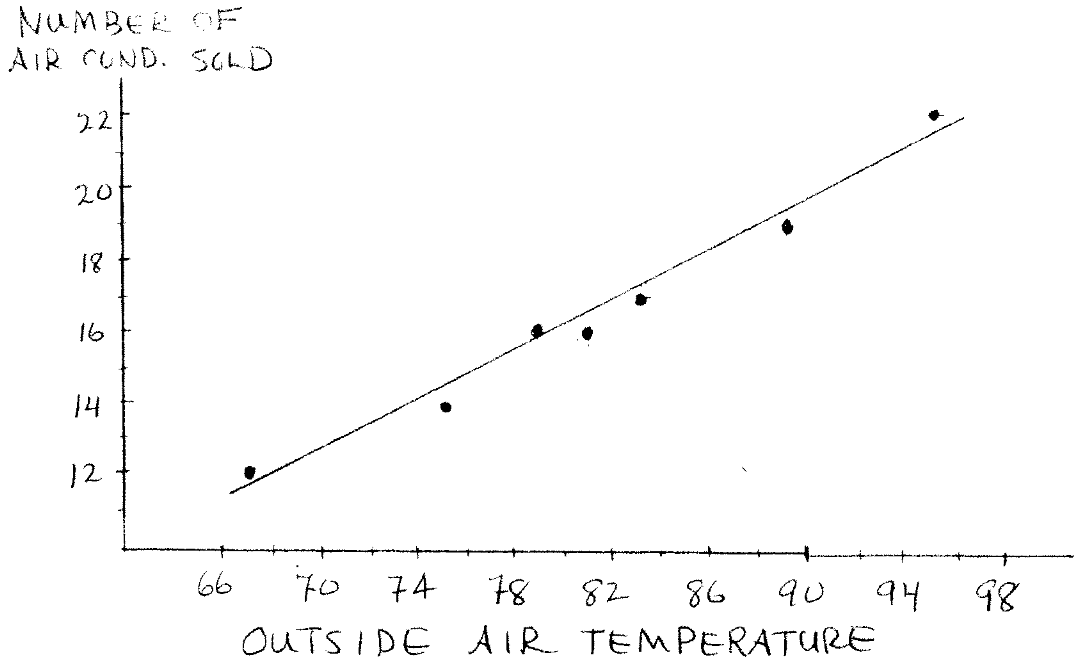
$n = (2.576)^2 \frac{(.7)(.3)}{(0.02)^2}$

$$\boxed{3484}$$

(3)

(a)

(e)



(b) $r \approx \boxed{0.991}$

(c) $H_0: \rho = 0$ TS: $t \approx 16.98$ P-Value ≈ 0.000013

$H_1: \rho \neq 0$

REJECT H_0

SIG. POS. LIN. CORR.

(d) $\boxed{\hat{y} \approx -12.2 + 0.35x}$

(e) see graph above

(f) $r^2 \approx 0.983$ $\boxed{98.3\%}$

(g) $y_1(70) \approx \boxed{12.6}$

(h) 95% P.I. $\alpha = 0.05$ $\alpha/2 = 0.025$ $CV_t: 2.571$

$n = 7$ $df = 5$

$\boxed{11.2 < Y < 14.0}$

(4) (a) $H_0: p_1 = p_2$

Claim → $H_1: p_1 > p_2$

$\alpha = 0.01$

✓ Claim
✓ Data
✓ α
✓ TS
✓ PV
✓ CON

SAMPLE DATA

WASHINGTON DC	TOKYO
$n_1 = 320$	$n_2 = 450$
$x_1 = 126$	$x_2 = 124$
$\hat{p}_1 = \frac{126}{320} \approx .394$	$\hat{p}_2 = \frac{124}{450} \approx .276$

$$\bar{p} = \frac{x_1 + x_2}{n_1 + n_2}$$

$$\bar{p} = \frac{126+124}{320+450} \approx .325$$

$$\bar{q} \approx .675$$

TEST STATISTIC

$$z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\frac{\bar{p}\bar{q}}{n_1} + \frac{\bar{p}\bar{q}}{n_2}}} \qquad z = \frac{(.394 - .276) - 0}{\sqrt{\frac{(.325)(.675)}{320} + \frac{(.325)(.675)}{450}}} \approx \boxed{3.45}$$

P-Value $\approx$ $\boxed{0.00028}$ P-Value $< \alpha$

$\boxed{\text{REJECT } H_0}$

There is sufficient evidence to support the claim that Americans living in Washington D.C. die of heart disease at a higher rate than Japanese living in Tokyo.

(b) 98% CI (0.038, 0.198)

Interval does NOT contain zero, so REJECT H_0

(c) Yes. Samples vary and we need to know if this is regular sample variation OR a statistically significant sample variation.

(5) $H_0: P_1 = P_2 = P_3 = P_4 = P_5$ claim

H_1: at least one proportion is NOT equal

✓ Claim
✓ Data
✓ α
✓ TS
✓ PV
✓ Con

$\alpha = 0.05$ (our choice)

SAMPLE DATA $n = 1185$, $K = 5$

Day of the week	MON	TUE	WED	THU	FRI
OBSERVED:	276	212	198	246	253
EXPECTED:	237	237	237	237	237

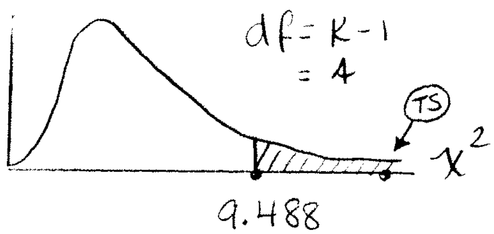
TEST STATISTIC

$$\chi^2 = \sum \frac{(O-E)^2}{E} \qquad \chi^2 = \frac{(276-237)^2}{237} + \dots + \frac{(253-237)^2}{237}$$

$$\chi^2 \approx 6.42 + \dots + 1.08$$

$$\chi^2 \approx \boxed{16.89}$$

CRITICAL VALUE



P-Value $\approx \boxed{0.002}$

P-Value < α $\boxed{\text{REJECT } H_0}$

There is sufficient evidence to reject the claim that the number of calls received by the business office is the same for each day of the week.

(6) (a) TEST STATISTIC $\chi^2 \approx \boxed{8.547}$ P-Value $\approx \boxed{0.073}$

$\alpha = 0.05$ (OUR CHOICE) FAIL TO REJECT H_0

(b) NMEAN gives $\boxed{150}$

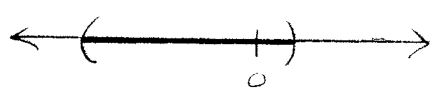
(c) TEST STATISTIC $\chi^2 \approx 14.878$ P-Value ≈ 0.189

$\alpha = 0.05$ (our choice) Fail to Reject H_0

(d) $r^2 \approx \boxed{0.726}$

72.6% of the variation in homicides can be explained by the variation in population size.

(e) 95% C.I. $(-2.816, 0.01571)$



INTERVAL CONTAINS ZERO so Fail to Reject H_0

(f) TEST STATISTIC: $F \approx \boxed{2.620}$

P-Value $\approx \boxed{0.114}$

$\alpha = 0.05$ (our choice) Fail to Reject H_0

There is NOT sufficient evidence to reject the claim that the means of the three groups are the same.