\( (1) \quad H_0: \mu = 8.4 \quad \text{claim} \quad H_1: \mu > 8.4 \)

\( \alpha = 0.05 \quad (our\ choice) \)

**SAMPLE DATA**

\( n = 28 \quad df = 27 \)

\( \bar{x} = 9.7 \)

\( s = 2.6 \)

**TEST STATISTIC**

\[
t = \frac{\bar{x} - \mu_i}{s} = \frac{9.7 - 8.4}{2.6} = 2.65
\]

**CRITICAL VALUE**

\( t = 1.703 \)

\( P\text{-Value} < 0.007 \)

\( P\text{-Value} < \alpha \)

TS is in critical region

**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.
(a) \[ P - E < P < P + E \]
\[ E = \frac{Z_{\alpha/2} \sqrt{\hat{p}(1-\hat{p})}}{n} \]
\[ 0.7 - E < P < 0.7 + E \]
\[ E = (2.576)\sqrt{\frac{(.7)(.3)}{250}} \]
\[ E \approx 0.075 \]

\[ 0.7 - 0.075 < P < 0.7 + 0.075 \]

\[ 0.625 < P < 0.775 \]

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

(b) \[ n = \left(\frac{Z_{\alpha/2}}{E}\right)^2 \cdot \frac{\hat{p}\hat{q}}{E^2} \]
for a 99% CI \[ \alpha = 0.01 \]
\[ \alpha/2 = 0.005 \]

\[ n = (2.576)^2 \cdot \frac{(.7)(.3)}{(0.02)^2} \]
\[ n = 3484 \]
(3)

(a) 

(e) 

(b) \[ r \approx 0.991 \]

(c) \[ H_0: \rho = 0 \quad TS: t \approx 16.98 \quad P-Value \approx 0.00013 \]

REJECT \( H_0 \)

SIG. POS. LIN. CORR.

(d) \[ y \approx -12.2 + 0.35x \]

(e) see graph above

(f) \[ r^2 \approx 0.983 \quad 98.3\% \]

(g) \[ y(70) \approx 12.6 \]

(h) 95% P.I. \[ x = 0.05 \quad s_x = 0.025 \quad CV_L: 2.571 \]

\[ n = 7 \quad df = 5 \]

11.2 < y < 14.0
(4) (a) $H_0: p_1 = p_2$

$H_1: p_1 > p_2$

$\alpha = 0.01$

**SAMPLE DATA**

<table>
<thead>
<tr>
<th>Washington DC</th>
<th>Tokyo</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n_1 = 320$</td>
<td>$n_2 = 450$</td>
</tr>
<tr>
<td>$x_1 = 126$</td>
<td>$x_2 = 124$</td>
</tr>
<tr>
<td>$\hat{p}_1 = \frac{126}{320} = 0.394$</td>
<td>$\hat{p}_2 = \frac{124}{450} = 0.276$</td>
</tr>
</tbody>
</table>

**TEST STATISTIC**

$z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\frac{\hat{p}\hat{q}}{n_1} + \frac{\hat{p}\hat{q}}{n_2}}} = \frac{(0.394 - 0.276) - 0}{\sqrt{\frac{(0.325)(0.675)}{320} + \frac{(0.325)(0.675)}{450}}} 

\approx 3.45$

**P-Value** \( < 0.00028 \)

P-Value $< \alpha$ 

**REJECT Ho**

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 Ho**

(c) Yes. Samples vary and we need to know if this is regular sample variation or a statistically significant sample variation.
(5) Claim $H_0: P_1 = P_2 = P_3 = P_4 = P_5$$\quad \text{Claim}$
$H_1: \text{at least one proportion is not equal}$

$\alpha = 0.05$ (own choice)

**Sample data**

<table>
<thead>
<tr>
<th>Day of the Week</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed</td>
<td>276</td>
<td>212</td>
<td>198</td>
<td>246</td>
<td>253</td>
</tr>
<tr>
<td>Expected</td>
<td>237</td>
<td>237</td>
<td>237</td>
<td>237</td>
<td>237</td>
</tr>
</tbody>
</table>

**Test Statistic**

\[
\chi^2 = \sum \frac{(O - E)^2}{E}
\]

\[
\chi^2 = \frac{(276 - 237)^2}{237} + \ldots + \frac{(253 - 237)^2}{237}
\]

\[
\chi^2 = 6.42 + \ldots + 1.08
\]

\[
\chi^2 \approx 16.89
\]

**P-Value**

\[
P-Value \approx 0.002
\]

**P-Value < $\alpha$**

\[
\text{Reject } H_0
\]

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.
(b) N-MEAN gives 150

(c) TEST STATISTIC $\chi^2 = 14.848$  P-Value $\approx 0.189$
$\alpha = 0.05$ (our choice)  
Fail to Reject $H_0$

(d) $r^2 = 0.726$

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

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

$\leftarrow$ INTERVAL CONTAINS ZERO $\rightarrow$
so  
Fail to Reject $H_0$

(f) TEST STATISTIC: $F = 2.620$

P-Value $\approx 0.114$

$\alpha = 0.05$ (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.