Homework #10 Solution
ENCE 302 - FALL 2001
Due M, 11/26

Problem 1:

Textbook: 5-22

$n = 20$; $\bar{x} = 32.4$; $\mu_o = 35$.

(a) Assume $\sigma^2 = 33$

$$z = \frac{\bar{x} - \mu_o}{\sigma/\sqrt{n}} = \frac{32.4 - 35}{\sqrt{33/20}} = 2.024$$

$z_{\alpha/2} = 1.96$

$\therefore$ reject H_o since $z > z_{\alpha/2}$

(b) $$t = \frac{\bar{x} - \mu_o}{S/\sqrt{n}} = \frac{32.4 - 35}{\sqrt{33/20}} = 2.024$$

$\nu = n - 1 = 19$

$t_{\alpha/2} = 2.093$

$\therefore$ accept H_o since $-t_{\alpha/2} < t < t_{\alpha/2}$

Problem 2:

Textbook: 5-26

$n = 200$; H_o: $\mu = 350$; H_A: $\mu > 350$; $\alpha = 1\%$; $\bar{x} = 359$; $S = 35$

$$t = \frac{359 - 350}{35/\sqrt{200}} = 3.637$$

Since $n > 30$, use z

$z_\alpha = 2.327$ $\therefore$ reject H_o

Problem 3:

Textbook: 5-30

$n = 58$; $S = 4095$; $\alpha = 1\%$; H_o: $\sigma = 3500$; H_A: $\sigma > 3500$

$$C = \frac{(n-1)S^2}{\sigma_o^2} = 57\left(\frac{4095}{3500}\right)^2 = 78.03$$

$\nu = 57$

$\chi^2_{.01} = 84.7$

$\therefore$ accept H_o; the evidence is not sufficient to reject the null hypothesis.

Problem 4:

Textbook: 5-47 (NOTE: in this problem, use confidence level $\alpha = 5\%$)

Since n = 58, approximately eight cells are needed. For equal probabilities, the cumulative z values can be obtained from the Table A-1 of the textbook. Then the upper cell bounds x_j are computed as $x_j = \bar{x} + zS = 8620 + z\,(4128)$, which are used to find the observed frequencies.

Cell	P	z	x_j	O_j	E_j	$(O_j-E_j)^2/E_j$
1	0.125	-1.150	3873	3	7.25	2.49
2	0.250	-.0.675	5834	11	7.25	1.94
3	0.375	-0.319	7303	12	7.25	3.11
4	0.500	0.000	8620	11	7.25	1.94
5	0.625	0.319	9937	5	7.25	0.70
6	0.750	0.675	11406	4	7.25	1.46
7	0.875	1.150	13367	4	7.25	1.46
8	1.000	∞	∞	8	7.25	0.08
Sum				58	58	13.17

The expected frequencies (E_j) are n/8 = 58/8 = 7.25. Since n, $\bar{x}$, and S were used to compute χ^2, then the degrees of freedom equals 8-3 = 5. For a 5% level of significance, $\chi^2_\alpha = 11.07$. Therefore, the null hypothesis of a normal distribution is rejected. What would the decision be if a level of significance of 1% were used?