

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

Problem 1:

Textbook: 5-22

$$n = 20; \bar{x} = 32.4; \mu_0 = 35.$$

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

$$z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} = \frac{32.4 - 35}{\sqrt{33/20}} = 2.024$$

$$z_{\alpha/2} = 1.96$$

\therefore reject H_0 since $z > z_{\alpha/2}$

$$(b) t = \frac{\bar{x} - \mu_0}{S/\sqrt{n}} = \frac{32.4 - 35}{\sqrt{33/20}} = 2.024$$

$$v = n - 1 = 19$$

$$t_{\alpha/2} = 2.093$$

\therefore accept H_0 since $-t_{\alpha/2} < t < t_{\alpha/2}$

Problem 2:

Textbook: 5-26

$$n = 200; H_0: \mu = 350; H_A: \mu > 350; \alpha = 1\%; \bar{x} = 359; S = 35$$

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

Since $n > 30$, use z

$$z_{\alpha} = 2.327 \therefore \text{reject } H_0$$

Problem 3:

Textbook: 5-30

$$n = 58; S = 4095; \alpha = 1\%; H_0: \sigma = 3500; H_A: \sigma > 3500$$

$$C = \frac{(n-1)S^2}{\sigma_0^2} = 57 \left(\frac{4095}{3500} \right)^2 = 78.03$$

$$v = 57$$

$$\chi_{.01}^2 = 84.7$$

\therefore accept H_0 ; 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?