KFUPM
Mathematical Sciences

Term 051
STAT 319
Quiz #5

Date: 24/12/2005
Duration: 15 minutes

Name: ID#: Serial#: Section#: 5 6

Write neatly and eligibly

Q1 (5 points): The shelf life of a photographic film is of interest to the manufacturer. The manufacturer observes the following shelf life for eight units chosen at random from the current production:

108	134	124	116	128	163	159	134

a. Is there any sufficient evidence that the mean life is grater than 125 days? Test at $\alpha = 0.05$ assume that shelf life is normally distributed?

(1) $H_0: \mu = 125$ vs. $H_1: \mu > 125$, $\alpha = 0.05$.

(1) $\boxed{\bar{x} = 133.25}$, $\boxed{s = 19.26}$ (1), $n = 8$

$t_{\alpha, n-1} = t_{0.05,7} = \boxed{1.895}$ (1) $T_0 = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{133.25 - 125}{19.26/\sqrt{8}} = \boxed{1.212}$ (1)

(1) $\boxed{DR:}$ If $T_0 > t_\alpha \Rightarrow$ Reject H_0.

Since $T_0 = 1.212 \not> 1.895 = t_\alpha \Rightarrow \boxed{\text{Accept } H_0.}$ (1)

$\boxed{\text{No, there is no such evidence.}}$ (1)

b. Find the p-value and use it to test the hypothesis in part (a).

(1)

p-value $= P(t_7 > T_0)$ (1) $= P(t_7 > 1.212) \Rightarrow \boxed{0.10 < \text{p-value} < 0.15}$

$\Rightarrow$ p-value $> \alpha \Rightarrow$ Accept H_0. (1)

Q2 (5 points): A fuel oil company claims that one-fifth of the homes in a certain city are heated by oil.

a. Do we have a reason to doubt this claim if, in a random sample of 1000 homes in this city, it is found that 136 are heated by oil? Use $\alpha = 0.05$.

Let X: # of homes heated by oil in 1000 homes $\Rightarrow X \sim B(1000, 0.136)$

$X \sim N(136, 117.504)$ because $np = 136 \geq 5$ & $nq = 864 \geq 5$

(1) $H_0: p = 0.2$ vs. $H_1: p \neq 0.2$, $Z_{\frac{\alpha}{2}} = Z_{0.025} = \boxed{1.96}$ (1)

(1) $Z_0 = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.136 - 0.2}{\sqrt{\frac{(0.2)(0.8)}{1000}}} = \frac{-0.064}{0.0126} = \boxed{-5.059}$ (1)

(1) since $|Z_0| = 5.059 > 1.96 = Z_{\alpha/2} \Rightarrow \boxed{\text{Reject } H_0}$ (1)

(1) Yes, we have a reason to doubt the claim.

b. Find the p-value and use it to test the hypothesis in part (a).

p-value $= P(|Z| > |Z_0|) = 2P(Z < -5.059)$ (1) $= 2(0)$ (1) $= 0$

since p-value $< \alpha \Rightarrow \boxed{\text{Reject } H_0.}$

With My Best Wishes