

Sample Quiz 5

1-3: step 1 state H_0 vs H_1

$H_0: \mu \geq 5$

$H_1: \mu < 5$

mean μ Key "Less than"
ref. value $\mu_0 = 5$

(1.A)

step 2 test stat $t_{cal} = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{4.1 - 5}{2.5/\sqrt{25}} = -1.80$ (2.D)

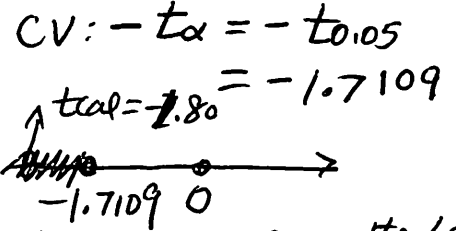
step 3 make a decision at $\alpha = 0.05$

P-value Approach: $DF = 25 - 1 = 24$

DF	0.05	0.025
24	1.7109	2.0639

$|t_{cal}| = 1.80$
P-value range $0.025 \sim 0.05 < 0.05$
we reject H_0 (3.A)

Critical Value Approach



$t_{cal} < -1.7109$ on the left
we reject H_0 (3.A)

4-6 step 1 state H_0 vs H_1

$H_0: p \leq 0.25$

$H_1: p > 0.25$

% proportion p Key "more than"

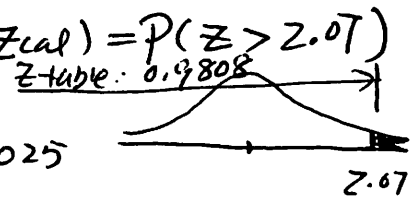
$p_0 = 0.25$

(4.A)

step 2 test stat $Z_{cal} = \frac{\bar{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{0.25 - 0.25}{\sqrt{\frac{0.25(1-0.25)}{70}}} = 2.0702$

step 3 find the P-value and make a decision

upper one tail test $P\text{-value} = P(Z > Z_{cal}) = P(Z > 2.07)$
 $= 1 - 0.9808$



$= 0.0192 < \alpha = 0.025$
P-value $< \alpha$, we reject H_0 (6.C)

7-8. Given $H_0: \mu = 32.50$

$H_1: \mu \neq 32.50$

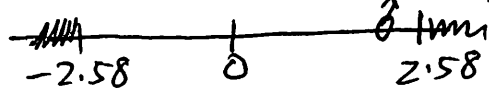
two-tailed test

step 2 test stat $Z_{cal} = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} = \frac{33.00 - 32.50}{1.35/\sqrt{36}} = 2.222$

(7.D)

step 3 make a decision using the critical value approach

(two-tailed) CV: $\pm Z_{\frac{\alpha}{2}} = \pm Z_{0.01} = \pm Z_{0.005} = \pm 2.58$



$Z_{cal} < 2.58$ on the right
we fail to reject H_0 (8.C)

9.

	Fail to reject H_0	Reject H_0
H_0 true	NO Error	type I error
H_1 true	type II error	NO Error

Type II error

(9.B)