Assignment 3 Solutions
201-401-DW
May 5th 2017

①

US	HK
$\bar{x}_1 = 518$	$\bar{x}_2 = 575$
$s_1 = 80$	$s_2 = 70$
$n_1 = 10$	$n_2 = 12$

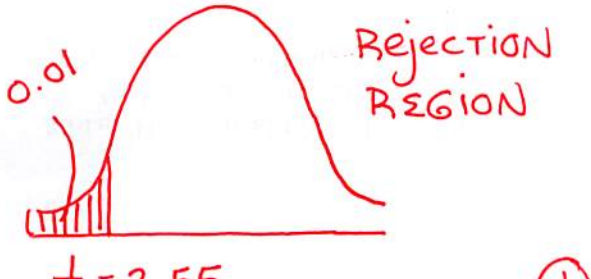
$H_0 : \mu_1 - \mu_2 = 0$ ②

$H_a : \mu_1 - \mu_2 < 0$

- We can use a t-test b/c populations are assumed to be Normal ①
- We use t-test b/c σ is unknown

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{s_1^4}{n_1^2(n_1-1)} + \frac{s_2^4}{n_2^2(n_2-1)}} = \frac{\left[\frac{80^2}{10} + \frac{70^2}{12}\right]^2}{\frac{80^4}{10^2 \cdot 9} + \frac{70^4}{12^2 \cdot 11}} = 18.11$$ ①

We use 18 degrees of freedom



①

Test statistic

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{518 - 575}{\sqrt{\frac{80^2}{10} + \frac{70^2}{12}}} = -1.76$$ ①

$t = -1.76$ IS NOT IN THE REJECTION REGION

FAIL TO REJECT H_0 (1)

THE EVIDENCE DOES NOT SUGGEST US STUDENTS' GRADES ARE LOWER THAN THOSE IN HONG KONG. (1)

(2)

OHIO

$n_O = 100$

$x_O = 34$

$\hat{p}_O = 34/100 = 0.34$

NEW JERSEY

$n_J = 200$

$x_J = 64$

$\hat{p}_J = 64/200 = 0.32$

$\alpha = 0.1$

$H_0: P_O - P_J = 0$

$H_a: P_O - P_J > 0$ (2)

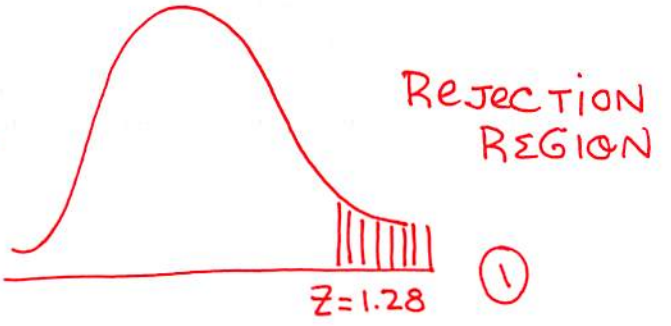
we can use the Z-TABLE because

$n_O \hat{p}_O = 34 > 5$

$n_O \hat{q}_O = 66 > 5$ (1)

$n_J \hat{p}_J = 200 \cdot 0.32 = 64 > 5$

$n_J \hat{q}_J = 200 \cdot 0.68 = 136 > 5$



(1)

$$P_{pool} = \frac{x_O + x_J}{n_O + n_J} = \frac{34+64}{100+200} = 0.3267$$ (1)

test statistic

$$Z = \frac{\hat{p}_o - \hat{p}_J}{\sqrt{p_{pool}(1-p_{pool})\left(\frac{1}{n_o}+\frac{1}{n_J}\right)}}$$

$$= \frac{0.34 - 0.32}{\sqrt{(0.3267)(0.6733)\left(\frac{1}{100}+\frac{1}{200}\right)}} \quad (1)$$

$$= 0.348$$

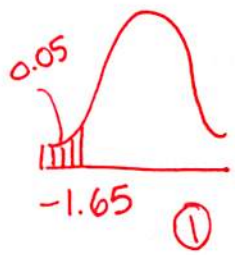
THE TEST STATISTIC IS NOT IN THE REJECTION REGION.

Fail to Reject H_0 (2)

THE proportion OF female-owned BUSINESSES IN OHIO IS NOT HIGHER THAN THOSE IN NEW JERSEY ACCORDING TO THE SAMPLE DATA.

(#3) $H_0: p = 0.5$ $\quad n = 331$ $\quad np$ & $nq = 165.5 > 5$

$H_a: p < 0.5$ (2) $\quad$ we can use Z-TABLE (1)



(1)

$$Z = \frac{\hat{p}-p}{\sqrt{\frac{pq}{n}}} = \frac{0.48-0.5}{\sqrt{\frac{(0.5)(0.5)}{331}}} = \frac{-0.02}{0.0275} = -0.73 \quad (1)$$

DO NOT reject H_0

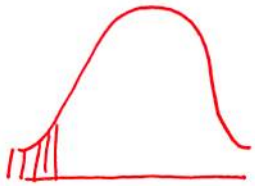
THERE IS NO EVIDENCE THAT NEWSPAPER claim IS CORRECT. (2)

#4 $H_0: \mu = 25 \quad (\mu \geq 25)$

$H_a: \mu < 25$ (2)

$n > 30$ $(n = 31)$ so we can use T-Table (1)
(σ IS UNKNOWN)

$\bar{x} = 19 \quad s = 9.6$



(1)

$df = 31 - 1 = 30$

$t = \dfrac{\bar{x} - \mu}{s/\sqrt{n}}$ (1)

$= \dfrac{19 - 25}{9.6/\sqrt{31}} = -3.48$

Reject H_0.

(2) THE STUDENT GROUP'S CLAIM IS INCORRECT

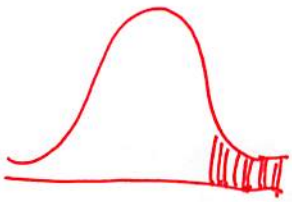
#5 $H_0: \mu = 170.1$

$H_a: \mu > 170.1$ (2)

$n = 8$

$\bar{x} = 190.375$ (1)

GAME LENGTHS are NORMAL & σ IS KNOWN (1)
So we use test



$t = \dfrac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \dfrac{190.375 - 170.1}{21/\sqrt{8}} = 2.73$ (1)

$z = 1.64$ (1)

Reject H_0.

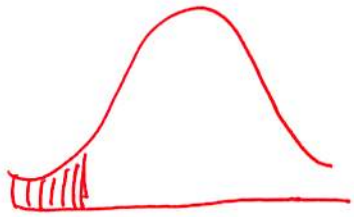
EVIDENCE SUGGESTS yankees GAMES are LONGER (2)

#6

$n = 200$
$\bar{x} = 62$
$\sigma = 7$

$H_0: \mu = 60$
$H_a: \mu < 60$ (2)

$n > 30$ we can use Z-TEST (1)
(σ is KNOWN)



$z = -1.28$ (1)

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{62 - 60}{7/\sqrt{200}} = 4.04$$ (1)

(2) We DO NOT reject H_0
THERE IS EVIDENCE THAT THE AVERAGE GRADE IS a PASSING ONE.