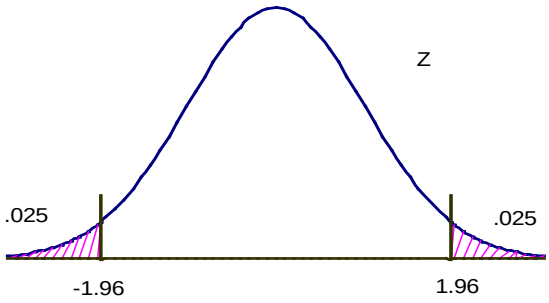
SOLUTION TO HOMEWORK: TWO-GROUP TESTS for P

PROBLEM 1:
Compare the pass rates on the Certified Financial Planning (CFP) exam using two learning approaches. Test at α=.05

Traditional Approach: 72/300 passed exam
Fully Online Approach: 40/200 passed exam

$$H_0 : P_1 = P_2$$
$$H_1 : P_1 \neq P_2$$



$$P_{S1} = .24$$
$$P_{s2} = .20$$

$$\overline{P} = \frac{72+40}{500} = \frac{112}{500} = .224$$

$$Z = \frac{.24-.20}{\sqrt{(.224)(.776)(\frac{1}{200}+\frac{1}{300})}} = \frac{.040}{.038} = 1.053$$

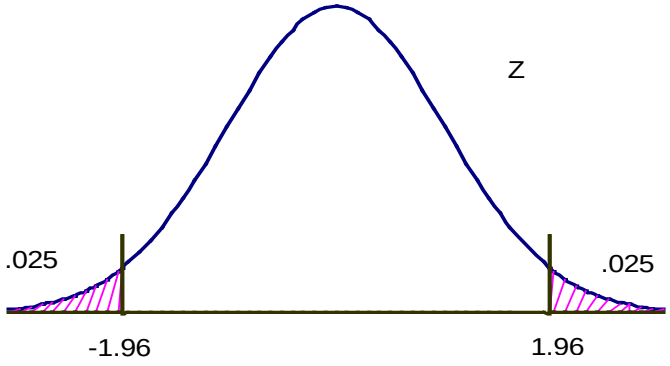
Do not Reject H_0 P > .05. There is no statistically significant difference between the two teaching approaches.

PROBLEM 2:
Percentage of people getting AIDS. Is there a difference ? Test at $\alpha = .05$.

Uncircumcised Men: 76/400 Infected with AIDS (19%)
Circumcised Men: 4/100 Infected with AIDS (4%)

$$H_0 : P_1 = P_2$$
$$H_1 : P_1 \neq P_2$$

$$P_{s1} = .19$$
$$P_{s2} = .04$$
$$\overline{p} = \frac{80}{500} = .16$$



$$Z = \frac{.19 - .04}{\sqrt{(.16)(.84)\left(\frac{1}{400} + \frac{1}{100}\right)}} = \frac{.15}{.04} = .3.75$$

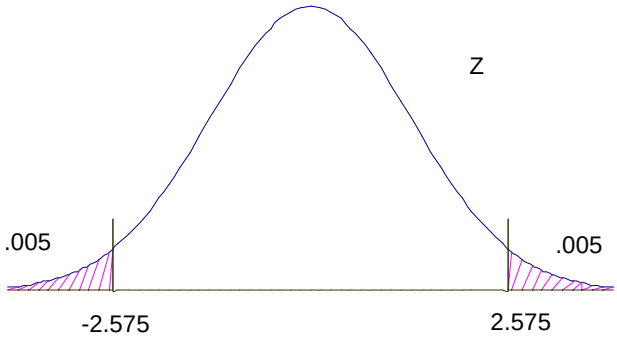
Reject H_0. $P < .05$. The above numbers are made up. However, there really was a study conducted by French researchers in Africa comparing circumcised and uncircumcised men with respect to AIDS. The difference was statistically significant.

PROBLEM 3:
Is there a difference between the two suppliers of solar panels in proportion of defectives?
Test at α=.01

Suppler A: 30/600 solar panels =defective
Suppler B: 10/400 solar panels =defective

$$H_0 : P_1 = P_2$$
$$H_1 : P_1 \neq P_2$$

$$P_{S1} = .050$$
$$P_{s2} = .025$$
$$\overline{p} = \frac{40}{1000} = .04$$



$$Z = \frac{.050 - .025}{\sqrt{(.04)(.96)\left(\frac{1}{600} + \frac{1}{400}\right)}} = \frac{.025}{..01265} = 1.98$$

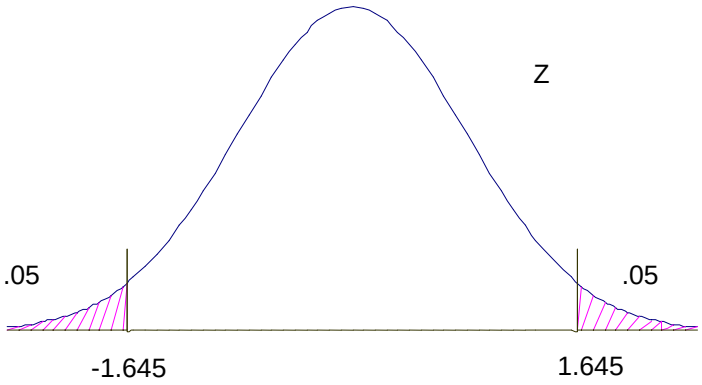
Do not reject H_0 P >. 01. The difference is not statistically significant.

PROBLEM 4:
Which school does better on the CPA exam? Test at .10 significance level.

CUNY: 30/100 Passed CPA Exam (all four parts)
SUNY: 40/180 Passed CPA Exam (all four parts)

$$H_0 : P_1 = P_2$$
$$H_1 : P_1 \neq P_2$$

$$P_{S1} = .30$$
$$P_{s2} = .22$$



$$\bar{p} = \frac{70}{280} = .25$$

$$Z = \frac{.30 -}{\sqrt{(.25)(.75)\left(\frac{1}{100} + \frac{1}{180}\right)}} = \frac{}{.05} = 1.48$$

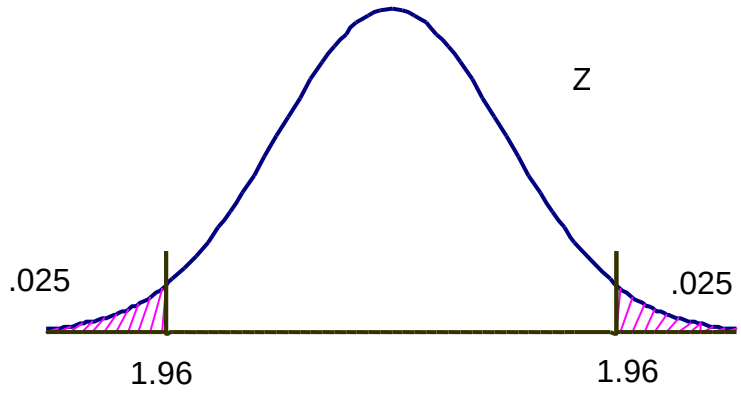
Do Not Reject H_0 P > .10. The difference in pass rates is not statistically significant.

PROBLEM 5:
Effect of estrogen on Alzheimer's Disease.
Test at α=.05

Of the Women receiving estrogen: 7/100 developed Alzheimer's
Of the Women not receiving estrogen: 27/150 developed Alzheimer's

$$P_{S1} = .07$$
$$P_{s2} = .18$$

$$\mathrm{H}_0 : P_1 = P_2$$
$$\mathrm{H}_1 : P_1 \neq P_2$$



$$\bar{p} = \frac{34}{250} = .136$$

$$Z = \frac{.07 - .18}{\sqrt{(.136)(.864)\left(\frac{1}{100} + \frac{1}{150}\right)}} = \frac{-.11}{.044} = -2.5$$

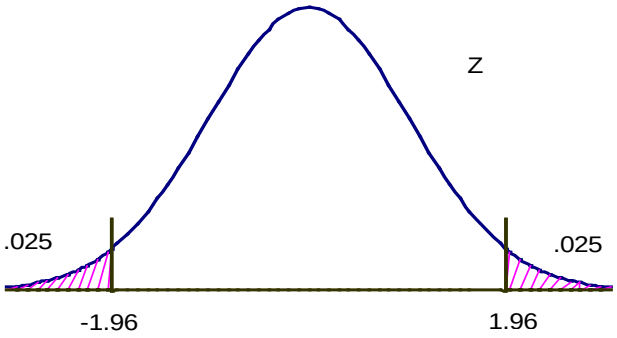
Reject H_0

PROBLEM 6:
Direct Mail –Should Company use Sweepstakes, or not? Test at α=.05

	Sweepstakes	No Sweepstakes
Mailed Out	5,000	4,000
# of Orders	100	60

$H_0 : P_1 = P_2$

$H_1 : P_1 \neq P_2$



$P_{S1} = .020$

$P_{s2} = .015$

$\overline{p} = 160/9000 = .018$

$$Z = \frac{.020 - .015}{\sqrt{(.018)(.982)\left(\frac{1}{5{,}000} + \frac{1}{4{,}000}\right)}} = \frac{.005}{.0028} = 1.79$$

Do not reject H_0. P > .05.