

SOLUTIONS: TWO-SAMPLE HYPOTHESIS TESTING
TWO-SAMPLE T-TESTS

PROBLEM 1:

Who lives longer, married or unmarried men? Test at $\alpha = .01$

Single Men

$$\bar{X}_1 = 72.5 \text{ years}$$

$$S_1 = 7.0 \text{ years}$$

$$n_1 = 14$$

Married Men

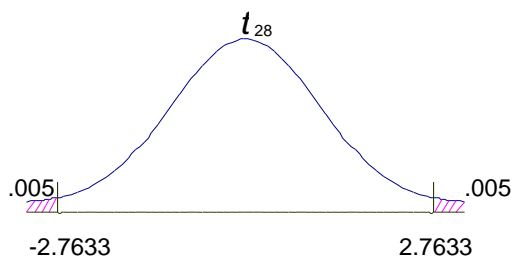
$$\bar{X}_2 = 74.5 \text{ years}$$

$$S_2 = 8.0 \text{ years}$$

$$n_2 = 16$$

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$



$$S_{pooled}^2 = \frac{13(49) + 15(64)}{28} = 57$$

$$t_{28} = \frac{-2}{\sqrt{57\left(\frac{1}{14} + \frac{1}{16}\right)}} = \frac{-2}{\sqrt{7.6}} = \frac{-2}{2.76} = -.72$$

Do not reject H_0 .

PROBLEM 2:

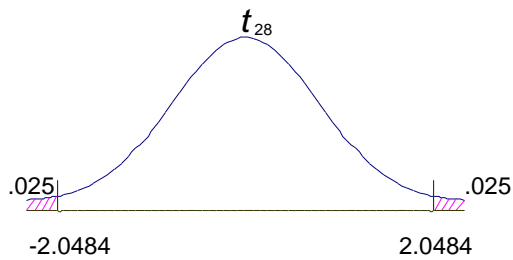
Who does better on the CPA EXAM? Test at .05 significance level

College A: Average score = 70.5; standard deviation = 15.0; n = 12

College B: Average score = 66.5; standard deviation = 10.0; n = 18

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$



$$S_{pooled}^2 = \frac{11(225) + 17(100)}{28} = 149.1$$

$$t_{28} = \frac{4}{\sqrt{149.1\left(\frac{1}{12} + \frac{1}{18}\right)}} = \frac{4}{\sqrt{20.71}} = \frac{4}{4.55} = 0.88$$

Do not reject H_0 . The 4-point difference is not statistically significant.

PROBLEM 3:

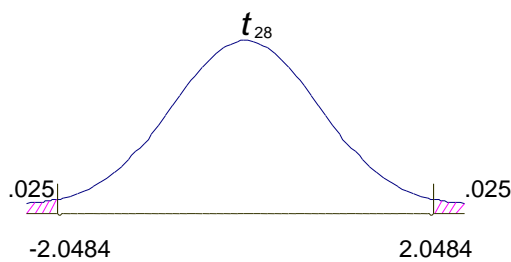
Who misses work more often: male managers or female managers? Test at .05 significance level

Female Managers: Average number of times absent from work = 10.9 days;
standard deviation = 2.4 days; $n = 10$

Male Managers: Average number of times absent from work = 9.9 days;
standard deviation = 1.8 days; $n = 20$

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$



$$S_{pooled}^2 = \frac{9(5.76) + 19(3.24)}{28} = 4.05$$

$$t_{28} = \frac{1}{\sqrt{4.05\left(\frac{1}{10} + \frac{1}{20}\right)}} = \frac{1}{\sqrt{.6075}} = \frac{1}{0.78} = 1.28$$

Do not reject H_0 . The 1 day difference is not statistically significant.

PROBLEM 4:

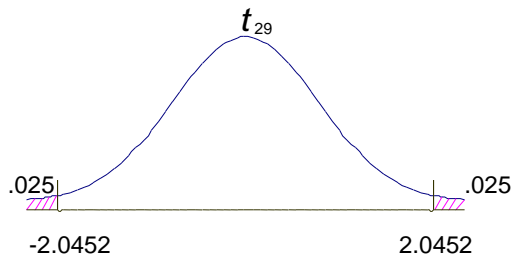
Which yogurt ice cream has less fat? Test at .05 significance level

Company A: Average amount of fat = 10.6 milligrams; standard deviation = 2.6 milligrams;
n = 13

Company B: Average amount of fat = 10.2 milligrams; standard deviation = 2.4 milligrams;
n = 18

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$



$$S_{pooled}^2 = \frac{12(6.76) + 17(5.76)}{29} = 6.17$$

$$t = \frac{.4}{\sqrt{6.17\left(\frac{1}{13} + \frac{1}{18}\right)}} = \frac{.4}{\sqrt{.817}} = \frac{.4}{0.90} = 0.44$$

Do not reject H_0 . The .4 milligram difference is not statistically significant.

PROBLEM 5:

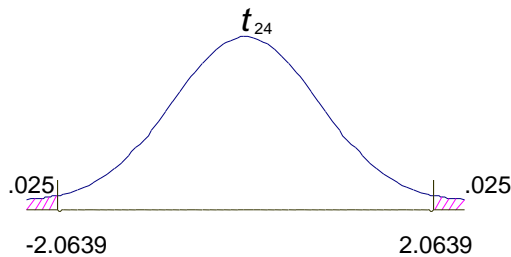
Which approach to treating brain cancer works best ? Test at .05 significance level

Approach A: lived on average and additional = 6.8 years; standard deviation = 1.6 years;
n = 14 patients

Approach B: lived on average and additional = 5.4 years; standard deviation = 2.4 years;
n = 12 patients

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$



$$S_{pooled}^2 = \frac{13(2.56) + 11(5.76)}{24} = 4.03$$

$$t_{24} = \frac{1.4}{\sqrt{4.03\left(\frac{1}{14} + \frac{1}{12}\right)}} = \frac{1.4}{\sqrt{.676}} = \frac{1.4}{0.82} = 1.77$$

Do not reject H_0 . The 1.4 year difference is not statistically significant.

PROBLEM 6:

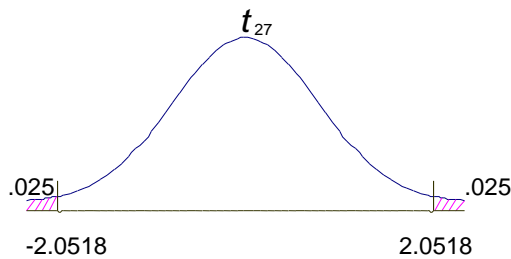
Who makes more money at Company X ? Test at .05 significance level

Men: Average gross income = \$48,500; standard deviation = \$1,000;
n = 18 employees

Women: Average gross income = \$43,600; standard deviation = \$2,000;
n = 11 employees

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$



$$S_{pooled}^2 = \frac{17(1000000) + 10(4000000)}{27} = 2,111,111$$

$$t_{27} = \frac{4900}{\sqrt{2,111,111(\frac{1}{18} + \frac{1}{11})}} = \frac{4900}{\sqrt{309,203}} = \frac{4900}{556} = 8.81$$

Reject H_0 ; The difference of \$4,900 in salary is statistically significant. This firm is paying the men more than the women.

PROBLEM 7:

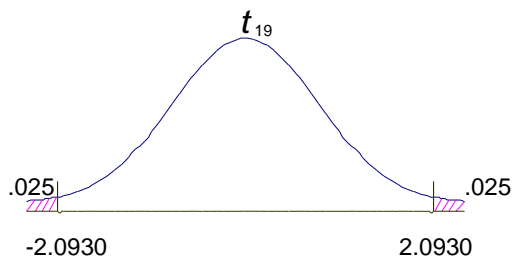
Who makes a better motor ? Test at .05 significance level

Company ABC: Average life= 14.50 years; standard deviation = 1.50 years;
n = 10

Company QQQ: Average life = 13.60 years; standard deviation = 2.10 years;
n = 11

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$



$$S_{pooled}^2 = \frac{9(2.25) + 10(4.41)}{19} = 3.39$$

$$t_{27} = \frac{.90}{\sqrt{3.39\left(\frac{1}{10} + \frac{1}{11}\right)}} = \frac{.90}{\sqrt{.647}} = \frac{.90}{.80} = 1.125$$

Do not Reject H_0 ; The difference of .9 years in motor life is not statistically significant.