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MA 331 A
10/31

Homework 4: 7.71, 7.89, 7.102, 7.122, 8.71

7.71 Sadness & Spending

a) No outliers or skew.

b)

Neutral:	Sad:
$\bar{x}_N = 0.5714$	$\bar{x}_S = 2.1176$
$s_N = 0.7300$	$s_S = 1.2441$
$n_N = 14$	$n_S = 17$

c) $H_0: \mu_N = \mu_S$ $H_a: \mu_N < \mu_S$

d) $\alpha = 0.05$ $df = 27$

$$t = \frac{.5714 - 2.1176}{\sqrt{1.0928\left(\frac{1}{14} + \frac{1}{17}\right)}} = -4.0982 \sim t(29)$$

$P(|T| < -|t|) = .0000980 = 0.0001 < \alpha$

reject H_0.

e) CI: $[-2.2842, -0.8082]$

7.89. Breast feeding vs. Baby Formula

a) $H_0: \mu_B = \mu_F$, $H_a: \mu_B > \mu_F$

$$t = \frac{13.3 - 12.4}{\sqrt{3.0475\left(\frac{1}{23} + \frac{1}{19}\right)}} = 1.6629 \sim t(40)$$

$P(|T| > |t|) = 0.053$

Accept H_0.

b) CI: $[-0.2, 0.2]$

c) Assumptions B & F are 2 SRSs w/ Normal population distributions

7.102. Comparison of standard Deviations.

	n	s^2
1	11	3.5
2	16	9.1

a) $H_0: \sigma_1 = \sigma_2$, $H_a: \sigma_1 \neq \sigma_2$

$$F = \frac{s_2^2}{s_1^2} = \frac{9.1}{3.5} = 2.6$$

b) $df_1 = 10$ $df_2 = 15$ $\frac{15}{10}$

$F(15,10) \rightarrow$ For this significance level, we would use 3.52

c) conclude that we reject H_0,

7.122. Two sample t-test vs matched pairs t-test

a) Group 1: $\bar{x} = 49.692$, $s_1^2 = 5.3726$

Group 2: $\bar{y} = 50.545$, $s_2^2 = 3.7032$

P = 0.3838
t = -0.8954
df = 16

$$t = \frac{\bar{x} - \bar{y}}{\sqrt{s_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} = \frac{49.692 - 50.545}{\sqrt{4.5379\left(\frac{1}{10} + \frac{1}{10}\right)}} = -0.8954$$

$$df = \left\lceil \frac{(s_1^2/n_1 + s_2^2/n_2)^2}{\frac{(s_1^2/n_1)^2}{n_1 - 1} + \frac{(s_2^2/n_2)^2}{n_2 - 1}} \right\rceil = \lceil 15.97 \rceil = 16$$

($n_1 - 1 = 9$, $n_2 - 1 = 9$)

b) $m = -0.853$
$s^2 = 1.6107$
$s = 1.2691$

P = 0.0625
t = -2.1255
dF = 9

$$t = \frac{m}{s/\sqrt{n}} = \frac{-0.853}{1.2691/\sqrt{10}} = -2.1255$$

c) the df is different because its 1-sample, so you don't have to pool it together. Also, the t value is different because the standard deviation isn't pooled together, it's just one sd.

8.71. Gender bias in textbooks.

a) $\hat{p}_F = 0.8$ $SE_F = 0.05164 = \sqrt{\hat{p}(1-\hat{p})/n}$

$\hat{p}_M = .3939$ $SE_M = 0.04253$

b) CI: $[0.6812, 0.7184]$

c)

	n	x	$\hat{p} = x/n$
F	60	48	0.8
M	132	52	0.3939
total	192	100	.5208

$\hat{p} = .5208$

$SE: \sqrt{.5208(1-.5208)\left(\frac{1}{60} + \frac{1}{132}\right)} = 0.07778$

$z = \frac{\hat{p}_F - \hat{p}_M}{SE} = \frac{0.8 - 0.3939}{0.07778} = 5.22$

$2P(z \geq 5.22) = 0.00000001789$

two proportions are equal.

I pledge my honor that I have abided by the Stevens Honor System.