

Himanshu Rana

MA 331 #6

"I pledge my honor that I have abided by the  
Stevens Honor System" - ~~Himanshu Rana~~

- 1) a) The true mean of the readings if the scale was perfectly calibrated would be 100g

b)  $100.0035 \pm 2.58 \left( \frac{.001}{\sqrt{5}} \right) = (100.002, 100.006)$

The true mean is under the perfect calibration assumption included in the CI

$$\alpha = .01 \quad H_0: \mu = 100 \quad H_1: \mu > 100 \quad \alpha = .001 \quad \sigma^2 = .000001$$
$$Z = \frac{100.0035 - 100}{\sqrt{\frac{.000001}{5}}} = \frac{.0035}{.000447} = 7.829$$

c)  $\left( \frac{2.58(.001)}{.0006} \right)^2 = 18.49 \quad n = 19$

- 2) a) control:  $n=10, \mu=14.59, s_1^2=.697$   
treatment:  $n=10, \mu=12.06, s_2^2=1.51$

$$CI_{1-\alpha} = \left[ \frac{s_1^2}{s_2^2} F_{\frac{\alpha}{2}}, \frac{s_1^2}{s_2^2} F_{1-\frac{\alpha}{2}} \right] \quad \frac{.697}{1.51}, \quad \frac{.697}{.314}$$
$$F_{\alpha} = F_{\frac{\alpha}{2}} = 3.18 \quad \frac{.697}{.314} = 2.22$$
$$F_{\alpha} = F_{1-\frac{\alpha}{2}} = \frac{1}{3.18} = .314 \quad \left( .145 \leq \frac{s_1^2}{s_2^2} < 1.47 \right)$$

$$b) H_0: \sigma_1^2 = \sigma_2^2 \quad \alpha = .05$$

$$H_1: \sigma_1^2 \neq \sigma_2^2$$

$$F = \frac{s_1^2}{s_2^2} = \frac{F(n_1-1, n_2-1)}{F(9, 9)} = 3.18$$

$$\frac{s_1^2}{s_2^2} = .462$$

$$K\alpha = P(F \leq K\alpha) = \frac{\alpha}{2} = .025$$

$$F_p(df1, df2) = \frac{1}{F_{1-p}(df2, df1)}$$

$$p = 2(P(F \leq F_{obs})) = .04995$$

$$= \frac{1}{F_{.95}(9, 9)} = \frac{1}{3.18} = .314$$

Reject because  $p\text{-value} < \alpha$   
 $.04995 < .05$