HW6

Problem 1.

Type I error relates when H_o holds but we reject it, in this case the Water temperature from the power plant is in 150 degrees F but we reject it.

The type II error is when H_o does not hold but we fail to reject it. In our case the Water is above 150 degrees F, but we do not reject it.

In the case of which type of error, I consider more serious it will be the Type II error. This is the case because this error implies the water temperature is above 150 degrees F, but we didn't realize it and we discharged the water into the river, damaging the ecosystem. While on the other case the error type I is when the temperature is not above 150 degrees, but we didn't discharger It into the river, in this case we didn't damage the ecosystem.

That is why I believe that the Type II error is more serious.

Problem 2.

For μ>10

$$2.51 \geq Z_\alpha$$

$$\alpha \geq 0.006$$

For μ<10

$$-2.65 \leq -Z_\alpha$$

$$\alpha \geq 0.004$$

Problem 3.

$$H_o = 12$$

$$H_a > 12$$

At a significance level $\alpha = 0.05$

Test statistics:

$$z = \frac{\bar{X} - \mu_o}{S/\sqrt{n}}.$$

$$z = \frac{12.6 - 12}{10.5/\sqrt{1000}} = 1.807$$

RR:

$$Z_\alpha = Z_{0.05} = 1.645$$

$$z > Z_\alpha$$

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$$1.807 > 1.645$$

Now z is in the rejection Region, so we reject H_o and accept $H_a > 12$

Type II error:

$$\beta(\mu') = \phi\left(Z_\alpha + \frac{\mu_o - \mu'}{S/\sqrt{n}}\right)$$

$$\phi\left(1.645 + \frac{12 - 13}{10.5/\sqrt{1000}}\right) = \phi(-1.36669)$$

$$\phi(-1.36669) = 0.08586125$$

$$\beta = 0.08586125$$

Problem 4.

$$H_o: \mu_1 - \mu_2 = 0$$

$$H_a: \mu_1 - \mu_2 > 0$$

At a significance level $\alpha = 0.01$

Test statistics:

$$z = \frac{\bar{X} - \bar{Y} - D_o}{\sqrt{\frac{S_1^2}{m} + \frac{S_2^2}{n}}}$$

$$z = \frac{18.12 - 16.87 - 0}{\sqrt{\frac{1.6^2}{40} + \frac{1.4^2}{32}}} = 3.532$$

RR:

$$Z_\alpha = Z_{0.01} = 2.325$$

$$z > Z_\alpha$$

$$3.532 > 2.325$$

Now z is in the rejection Region, so we reject H_o and accept $H_a: \mu_1 - \mu_2 > 0$

Problem 5.

Solution on file: Ttest_Alex_C_Parra_Garcia.pdf

Problem 6.