Exam 3 Review answers

1. (8.43, 11.97) since $\sigma$ is known as it rather than $s$
   a. We are 92% confident that the population average time that children who need braces wear braces is between 8.43 and 11.97 months.

2. a. 0.58
   b. (0.57, 0.59)

3. a. $H_0: \mu \leq 259$ $H_a: \mu > 259$
   b. $H_0: p = 0.35$ $H_a: p \neq 0.35$

4. a

5. $H_0: \mu \geq 300$ $H_a: \mu < 300$
   p-value = 0.99
   Don’t reject $H_0$.
   There is not sufficient evidence to conclude that the average cost of textbooks per quarter is less than $300$.
   Type I error: I believe the cost of textbooks per quarter is less than $300$, when, in fact, it is at least $300$.
   Type II error: I believe the cost of textbooks per quarter is at least $300$, when, in fact it is less than $300$.

6. $H_0: p \geq 0.47$ $H_a: p < 0.47$
   p-value = 0.1099
   Don’t reject $H_0$.
   There is not sufficient evidence to conclude that the approval rating is less than 47%.
   Type I error: To believe that the percent is less than 47%, when, in fact, it is at least 47%.
   Type II error: To believe that the percent is at least 47%, when, in fact, it is less than 47%.

7. $H_0: \mu_a = \mu_n$ $H_a: \mu_a \neq \mu_n$
   p-value = 0.0000
   Reject $H_0$.
   There is sufficient evidence to conclude that the average number of hours studied weekly by athletes and non-athletes is different.
   Type I error: To believe the number of hours studied weekly by athletes and non-athletes is different, when, in fact, they are the same.
   Type II error: To believe the number of hours studied weekly by athletes and non-athletes is the same, when, in fact, they are different.

8. $H_0: \mu_d \geq 0$ $H_a: \mu_d < 0$
   p-value = 0.1580 (average of differences = -1 and $s_d = 2.62$)
   Don’t reject $H_0$.
   There is not sufficient evidence to conclude that the class improves client times.
   Type I error: To believe there is improvement in client times when, in fact, there is not improvement.
   Type II error: To believe there is no improvement in client times when, in fact, there is improvement.

9. $H_0: p_F = p_D$ $H_a: p_F > p_D$
   At 5% LOS, test is inconclusive.
   Type I error (at 1% LOS): To believe the proportion of people in France who are against the Euro is higher than that in Denmark, when, in fact, the proportions are equal.
   Type II error (at 1% LOS): To believe the proportion of people in France who are against the Euro is the same as in Denmark, when , in fact, the proportion in France is higher.