Math 741 Assignment 13 (Quiz)

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7.4.1. solution:
a) 0.15003.
b)0.799935.
c) 0.85003.
d)0.83993.

7.4.2. solution:
a)Symmetric $x = 2.5083245$.
b)$x = -1.07947$.
c) $x = 1.70562$.
d)$x = 4.30265$.

7.4.3. solution: $t_{0.5,n} - t_{0.10,n}$ is larger, since the distribution looks like standard normal.

7.4.4. solution: Using student t distribution,

$$P(-a < \frac{\bar{Y} - 27.6}{S/\sqrt{9}} < a) = 0.8 \implies (-a, a) = (-1.3968, 1.3968)$$

$$P(-a < \frac{\bar{Y} - 27.6}{S/\sqrt{9}} < a) = 0.9 \implies (-a, a) = (-1.8595, 1.8595)$$

7.4.5. solution:

$$P(|\frac{\bar{Y} - 15.0}{S/\sqrt{11}}| \geq k) = 0.05$$

$$P(|\frac{\bar{Y} - 15.0}{S/\sqrt{11}}| \leq k) = 0.95$$

$$P(-k \leq \frac{\bar{Y} - 15.0}{S/\sqrt{11}} \leq k) = 0.95$$

$$P(\frac{\bar{Y} - 15.0}{S/\sqrt{11}} \leq -k) = 0.025 \implies k = 2.22814$$

7.4.6.(H) solution:

$$P[9.06 - k(S) \leq \bar{Y} \leq 90.6 + k(S)] = 0.99$$

$$P[-k(S) \leq \bar{Y} - 90.6 \leq k(S)] = 0.99$$

$$P[\bar{Y} - 90.6 \leq -k(S)] = 0.005$$

$$P[\frac{\bar{Y} - 90.6}{S/\sqrt{20}} \leq \frac{-k(S)}{S/\sqrt{20}}] = 0.005$$

$$\implies \frac{-k(S)}{S/\sqrt{20}} = -2.861 \implies k(S) = \frac{2.861S}{\sqrt{20}} = 0.6397S$$

7.4.7. solution: calculator using list and t-interval. $(0.86875, 1.15325)$

7.4.11. solution:calculator using list and t-interval. $(175.6, 211.4)$ The medical and statistical definition of "normal" differ somewhat. There are people with medically normal platelet counts who appear in the population less than 10% of the time.

7.4.12.(H) solution: Let E denote margin of error, then

$$2E = 49.9 - 44.7 \implies E = 2.6$$

Therefore, $\bar{y} = 44.7 + 2.6 = 47.3$ and

$$E = |t_{0.025,15}| \cdot \frac{s}{\sqrt{16}} = 2.6 \implies s = \frac{10.4}{|t_{0.025,15}|} = 4.8793$$

7.4.13. solution:No, because the length of a confidence interval for μ is a function of s as well as the confidence coefficient. If the sample standard deviation for the second sample was sufficiently small (relative to the sample standard deviation for the first sample), the 95% confidence interval would be shorter than the 90% confidence interval.

7.4.14. solution: Let $\alpha = 0.05$ and $n = 9$, then

$$(59540 - t_{0.025,8}\frac{6860}{\sqrt{9}}, 59540 + t_{0.025,8}\frac{6860}{\sqrt{9}}) = (54266.937, 64713.063)$$

7.4.17. solution:

7.4.19. solution: We can formulate the test as following,

$$H_0 : \mu = 40$$

$$H_1 : \mu < 40$$

where $n = 15, \alpha = 0.05$.
Using calculator, t-test. We can obtain P-value = 0.02053. Since P-value $< \alpha$, reject H_0.

7.4.20.(H) solution: Given the test,

$$H_0 : \mu = 0.618$$

$$H_1 : \mu \neq 0.618$$

with $n = 34, \alpha = 0.01$. Enter the data in the list of calculator and obtain P-value $= 0.43191 > \alpha = 0.01$. Then fail to reject H_0. There is enough evidence to conclude the national flags follows the golden ratio.

7.4.21. solution: We can formulate the test as following,

$$H_0 : \mu = 0.0042$$

$$H_1 : \mu < 0.0042$$

with $n = 10$, $\alpha = 0.05$. Enter the data in the list of calculator and obtain P-value $= 0.017577 < \alpha = 0.05$. Then reject H_0. There is enough evidence to say that the plastic coating is not beneficial.

7.4.23. solution:

7.4.25. solution: $f_Z(z)$