583 ObQ2

Math 490 Quiz 2 Fall 2011 Name___________

1) Consider the following data set on Spring 2004 Math 580 total scores.

66.5 84.1 84.6 84.7 90.7 91.8 93.4 95.2 96.3 98.5

Then $\overline{Y} = 88.58$ and $S^2 = 86.4907$.

10 a) Find SE($\overline{Y}$). $= \frac{S}{\sqrt{n}} = \sqrt{\frac{86.4907}{10}} = \boxed{2.9409}$

5 b) Find the degrees of freedom p for the classical CI based on $\overline{Y}$. $= n-1 = \boxed{9}$

Parts c)-g) refer to the CI based on MED(n).

10 c) Find the sample median MED(n).

$\frac{90.7+91.8}{2} = \boxed{91.25}$

5 d) Find L_n. $\lfloor \frac{n}{2} \rfloor - \lceil \sqrt{\frac{n}{4}} \rceil = 5 - \lceil 1.58 \rceil = 5-2 = \boxed{3}$

5 e) Find U_n. $= n - L_n = 10-3 = \boxed{7}$

5 f) Find the degrees of freedom p $= U_n - L_n - 1 = 7-3-1 = \boxed{3}$

10 g) Find SE(MED(n)). $0.5\,(Y_{(U_n)} - Y_{(L_n+1)}) = \frac{1}{2}(Y_{(7)} - Y_{(4)})$

$= \frac{93.4-84.7}{2} = \boxed{4.35}$

$\overline{}$
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2) Consider the following data set on Spring 2004 Math 580 total scores.

66.5, 84.1, | 84.6, 84.7, 90.7, 91.8, 93.4, 95.2, | 96.3, 98.5

Consider the CI based on the 25% trimmed mean.

5 a) Find L_n. $\lfloor \frac{n}{4} \rfloor = \lfloor \frac{10}{4} \rfloor = \lfloor 2.5 \rfloor = \boxed{2}$

5 b) Find U_n. $n - L_n = 10 - 2 = \boxed{8}$

5 c) Find the degrees of freedom p $U_n - L_n - 1 = 8 - 2 - 1 = \boxed{5}$

10 d) Find the 25% trimmed mean T_n.

$$\frac{84.6 + \cdots + 95.2}{6} = \frac{540.4}{6} = \boxed{90.067}$$

5 e) Find $d_1, ..., d_{10}$.

84.6 84.6 84.6 84.7 90.7 91.8 93.4 95.2 95.2 95.2

5 f) Find $\overline{d}$. $= \frac{\sum d_i}{n} = \frac{900}{10} = \boxed{90}$

5 g) Find $S^2(d_1, ..., d_{10})$. $= \frac{\sum d_i^2 - n(\overline{d})^2}{n-1} = \frac{81211.98 - 10(90)^2}{9}$

$$= \frac{211.98}{9} = \boxed{23.5533}$$

10 e) Find SE(T_n).

$$V_{SW} = \frac{S^2(d_1,...,d_n)}{\left(\frac{U_n - L_n}{n}\right)^2} = \frac{23.5533}{\left(\frac{8-2}{10}\right)^2} = 65.42593$$

$$SE(T_n) = \sqrt{\frac{V_{SW}}{n}} = \sqrt{\frac{65.42593}{10}} = \boxed{2.5578}$$

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2.5

1) The data below are a sorted residuals from a least squares regression where $n = 100$ and $p = 4$. Find shorth(97) of the residuals.

number	1	2	3	4	...	97	98	99	100
residual	-2.39	-2.34	-2.03	-1.77	...	1.76	1.81	1.83	2.16

$1.76 + 2.39 = 4.15$

$1.81 + 2.34 = 4.15$

$1.83 + 2.03 = 3.86 \leftarrow$

$2.16 + 1.77 = 3.93$

$\boxed{\text{Shorth}(97) = [-2.03, 1.83]}$

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e 2) Suppose you are estimating the mean μ of losses with $T = \overline{X}$.
actual losses 14, 3, 5, 12, 20, 10, 9: $\overline{X} = 10.4286$,

1.nmod E3d19

a) Compute $T_1^*, ..., T_4^*$, where T_i^* is the sample mean of the i bootstrap sample.
bootstrap samples:

12, 3, 10, 14, 5, 9, 10: $63/7 = 9$

10, 14, 5, 10, 10, 10, 9: $68/7 = 9.7143$

20, 5, 5, 3, 5, 20, 5: $63/7 = 9$

12, 20, 5, 14, 12, 14, 20: $97/7 = 13.8571$

b) Now compute the bagging estimator which is the sample mean of the T_i^*: the bagging estimator $\overline{T}^* = \frac{1}{B}\sum_{i=1}^{B} T_i^*$ where $B = 4$ is the number of bootstrap samples.

$$\frac{9 + 9.7143 + 9 + 13.8571}{4} = \frac{41.5714}{4}$$

8 or 9

$$= \boxed{10.39285}$$

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