

DelftX: OT.1x Observation theory: Estimating the Unknown

Help

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- 6. Does the estimate make sense?

Warming up

6. Does the estimate make sense? > Assessment > Module 6 Assessment - Part 1

Module 6 Assessment - Part 1

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The following questions are part of the graded assignments for the assessment of module 6. The number of points per question is indicated. The total number of points you can earn in this module is 16.

Note, the second part of the assessment includes a MATLAB exercise (next unit).

Calculating the critical value

2/2 points (graded)

Assume we have a linear model with Gaussian observables. The number of observations is m and the number of unknown is n. The BLU estimate of residual vector has been given as \hat{e} .

For each of the following situation, compute the critical value for the overall model test, and determine whether the test is accepted or not.

Case 1:

$$m=95$$
, $n=5$, $lpha=0.025$, and $\hat{e}^TQ_{yy}^{-1}\hat{e}=120$.

What is the OMT critical value K_{α} (upto 2 decimal places)?

6.1.	Overall	Model	Test
(OV	IT)		

6.2. OMT: Interpretation

Assessment

Graded Assignment due Feb 8, 2017 17:30 IST

Q&A Forum

Feedback

Post-survey

- Pre-knowledgeMathematics
- MATLAB Learning Content



Is the OMT accepted or not?

Accepted

118.14

Rejected

Answer

Correct: $120
ot< k_{lpha} = 118.14$, so the test is rejected

Case 2:

m=95, n=5, lpha=0.001, $Q_{yy}=10I_m$ (I_m is the identity matrix) and $\hat{e}^T\hat{e}=1300$.

What is the OMT critical value K_{lpha} (upto 2 decimal places)?

137.21

~

137.21

Is the OMT accepted or not?

Accepted

Rejected

Answer

Correct: $T=rac{1300}{10}=130$, so $T\leq k_lpha=137.21$. The test is accepted

Submit

You have used 1 of 1 attempt

✓ Correct (2/2 points)

Effect of an optimistic stochastic model

1/3 points (graded)

Three independent observations of a certain unknown distance $m{l}$ are made and the standard deviations are assumed to

be 1 cm. The observations are assumed to be normally distributed. Distance $m{l}$ is to be estimated.

It is found out that the assumed standard deviation was too optimistic, and should have been 2 cm. Then

- ullet The overall model test statistic will be too large by a factor S (i.e., S>1) 🗸
- ullet The overall model test statistic will be too small by a factor S (i.e., 1>S) lacktriangle

ullet The overall model test statistic will be unchanged (i.e., S=1)

What will be the value of the factor S?

1/4

X Answer: 4

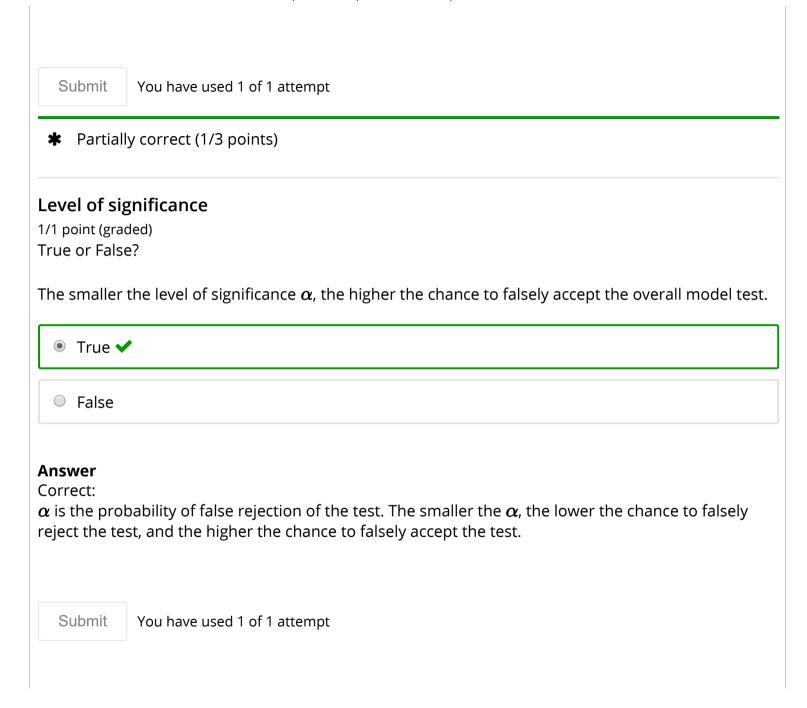
 $\frac{1}{4}$

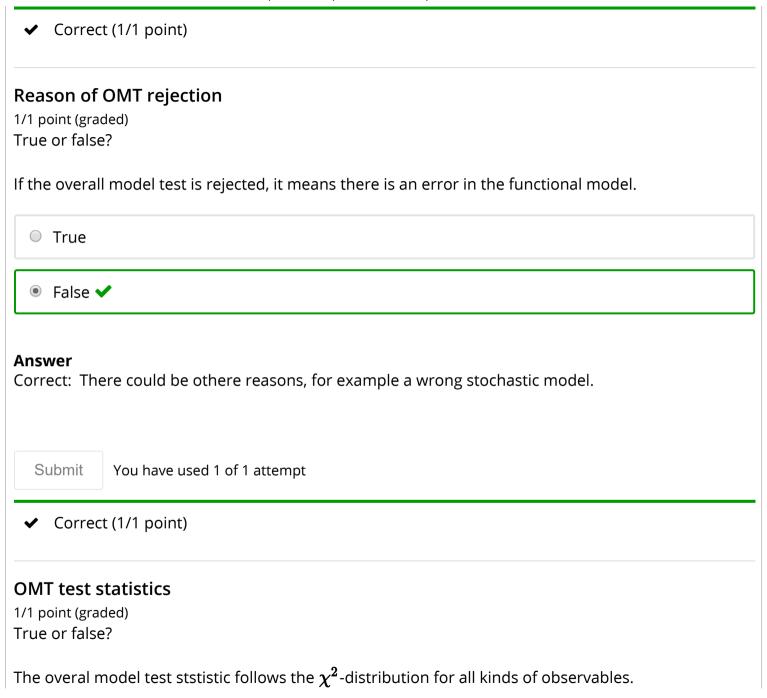
It means that there is a ______ probability that the overall model test is rejected than if the correct standard deviation would have been used.

- higher
- smaller
- equal

Feedback

 $S=rac{rac{1}{1}\hat{e}^{\mathrm{T}}\hat{e}}{rac{1}{4}\hat{e}^{\mathrm{T}}\hat{e}}=4$. The probability that the test is rejected is higher.





O True			
● False ✔			
Answer Correct: It follows χ^2 -distribution only if observables are normally distributed.			
Submit You have used 1 of 1 attempt			
✓ Correct (1/1 point)			
OMT with no redundancy 0/1 point (graded)			
Assume a linear observation-equations system $\mathbf{E}\{\underline{y}\}=Ax$, where observables are normally distributed, with m observations and n unknowns. Matrix A is full rank.			
If $oldsymbol{m}=oldsymbol{n}$ then			
The overall model test is always accepted			
The overall model test is always rejected			

The overall model test is un-defined (it is not possible to apply the overall model test)

Answer

Incorrect:

In this case, the system is determined and consistent, theere are zero degrees of freedom. The residual vector, and so the test ststistic will be zero as well. But the χ^2 -distribution can not be defined for 0 degrees of freedom. In principle, with no redundacy, it is not possible to apply the testing.

Submit

You have used 1 of 2 attempts

★ Incorrect (0/1 point)

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