

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

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Graded Assignment due Feb 8, 2017 17:30 IST

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Module 2 Assessment - Part 2 (incl. MATLAB)

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You have 6 monthly measurements of the height of a point on a glacier. The measurements are obtained from a satellite laser altimeter.

Time [months]: [0, 1, 2, 3, 4, 5]

Observed heights [meters]: [100.9, 99.6, 98.7, 99.9, 100.3, 98.5]

We will consider four different functional models, with the following observation equations:

Model 1: zero-order polynomial: $E\{\underline{y}_i\}=x_0$

Model 2: second order polynomial: $E\{\underline{y}_i\}=x_0+x_1t_i+x_2t_i^2=\sum_{p=0}^2x_pt_i^p$

Model 3: fifth order polynomial: $E\{\underline{y}_i\} = \sum_{p=0}^5 x_p t_i^p$

Model 4: $E\{\underline{y}_i\} = x_0 + x_1 \cdot t_i + x_2 \cos\!\left(rac{2\pi t_i}{12}
ight)$

- 4. Best Linear Unbiased Estimation (BLUE)
- Pre-knowledgeMathematics
- MATLAB Learning Content

MATLAB ASSIGNMENT GLACIER MODEL (EXTERNAL RESOURCE)

Glacier model

You will now define the A-matrix for each of the four models of the height change of a point on a glacier (see introduction above).

What is the redundancy for each model?

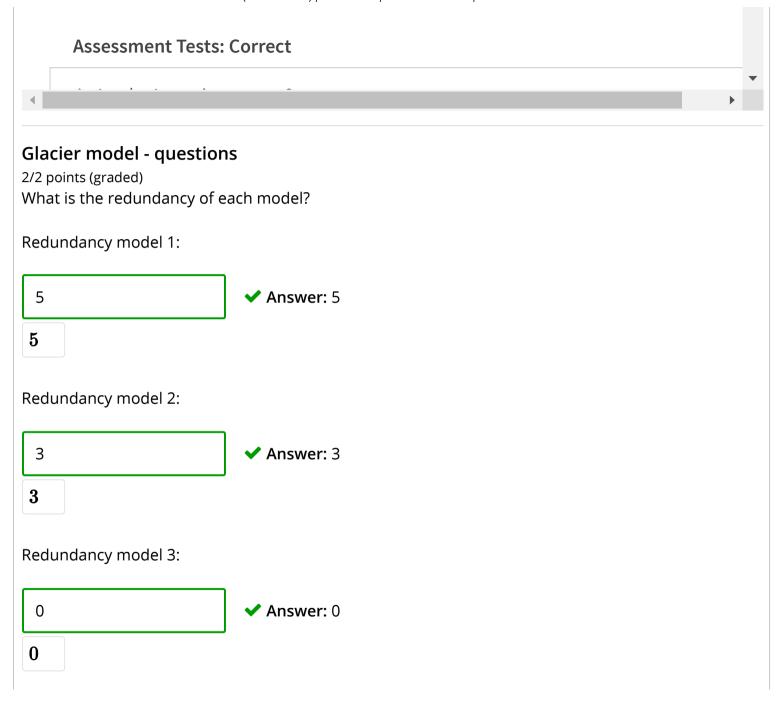
Your Solution

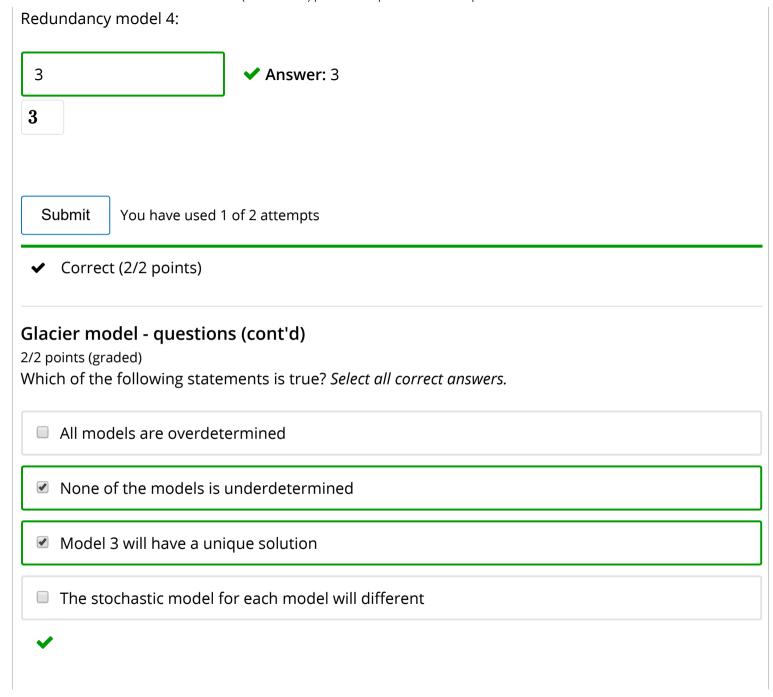
Save C Reset MATLAB Documentation (https://www.mathworks.com/help/)

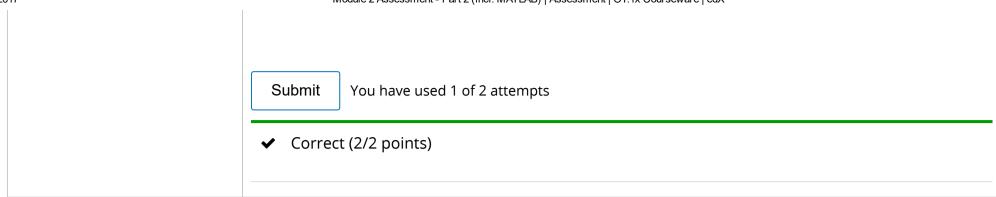
```
1 % times of observation [months]
2 t = [0 1 2 3 4 5]';
3 % observed heights [m]
4 | y = [100.9 99.6 98.7 99.9 100.3 98.5]';
6 % number of observations
7 m = length(t);
9 % design matrices for the four models [complete the code on all 4 lines below]
|10| A1 = ones(6, 1)
|11| A2 = [A1, t, t.^2]
12 A3 = [A1, t, t.^2, t.^3, t.^4, t.^5]
13 A4 = [A1, t, cos(2*pi*t/12)]
14
15 % what is the redundancy with each model? [complete the code on all 4 lines below
16 r1 = 5
|17| r2 = 3
| 18 | r3 = 0 
19 r4 = 3
20
21
```

Run

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