Exercises: Model formulation

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Definitions and notation

3/3 points (ungraded)

The model of observation equations (or mathematical model) consists of:

- A functional model
- A stochastic model
- The functional and stochastic model ✔
- A first principles physical model

Which description fits best to 'the functional model'?

- A model that describes a function

- A model that relates deterministic and stochastic variables
- A model that relates observations to observables
- A model that relates parameters to observables ✔

The underline under a letter indicates:

- That this variable is a vector
- That this variable is deterministic
- That this variable is stochastic ✔
- That this variable is a scalar

Answer
Correct: Correct

Explanation
Note: the notation adopted here is not universal, for instance in other textbooks you will find other notation conventions.

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✔ Correct (3/3 points)

Dimensions

4/4 points (ungraded)

What is the dimension of A?

- ◉ $m \times n$ ✔
- ○ $n \times 1$
- ○ $m \times 1$
- ○ 1×1

What is the dimension of y?

- ○ $m \times n$

- $n \times 1$
- $m \times 1$ ✔
- 1×1

What is the dimension of e?

- $m \times n$
- $n \times 1$
- $m \times 1$ ✔
- 1×1

What is the dimension of Ax?

- $m \times n$
- $n \times 1$

- (selected) $m \times 1$ ✔
- 1×1

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✔ Correct (4/4 points)

What's in the vector?

2/2 points (ungraded)

y is the vector with

- observables
- unknown parameters
- (selected) observations ✔

e is the vector with

- (•) random measurement errors ✔
- ( ) unknowns
- ( ) deterministic measurement errors

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✔ Correct (2/2 points)

True or False?

4/4 points (ungraded)

An observable is a realization of an observation.

false ▾ ✔ **Answer:** false

Explanation

The other way around: an OBSERVATION is a realization of an OBSERVABLE.

The vector of unknown parameters is always deterministic

true ▾ ✔ **Answer:** true

Each measurement always has an error

true ✔ **Answer:** true

Suppose we have a vector of observations $[2.1 \;\; 1.8 \;\; 2.0 \;\; 2.1]^T$. We will indicate this vector as $\underline{y}$.

false ✔ **Answer:** false

Explanation
The observations are given and deterministic, therefore notation y without underlining is used.

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✔ Correct (4/4 points)