1. The use of models by managers is dangerous due to different factors including unawareness of model limitations or using the model for purposes for which the model was not developed. Which of the following strategies guarantees that managers can safely use the developed models?
    a. Managers should use models to define the scope of a problem, to make assumptions explicit, to examine what is known and what is not, and to explore possible outcomes beyond the obvious ones.
    b. Scientists should create a wider awareness of what the whole modelling process entails, what choices are made, what constitutes good practice for testing and applying models and how the results of using models should be viewed
    c. Scientists should reduce the number of model types they use so that it is easier for managers to understand them.
    d. Modelers should define the scope and objectives of the model, involve stakeholders from the beginning, and reporting on model checks, but also asking for independent model auditing.
    e. Modelers should provide the source code of their models together with a independent audit of its performance.

2. The involvement of end-users in the modeling process can be very useful. Which roles can end-users play?
    a. End users can be part of the project team to ensure that the model fits their needs and that they will use the model after the development ends. can but not a must
    b. End users can play an important role in getting access to data to calibrate, validate and test the models.
    c. End users can help to develop a conceptual model for the problem being addressed.
    d. All of the above
    e. None of the above

3. Overfitting is an often mentioned problem in model design. Which of the examples below illustrates overfitting best?
    a. A strict exploratory analysis is conducted before the modeling phase, reducing the number of variables that the modeler can use.
    b. A sensitivity analysis is conducted at a very early stage of the modeling process
    c. A single dataset is used to develop a data-driven model
    d. A model is tuned to reproduce the available data by including too many variables and/or parameters
    e. None of the above

4. The modeling cycle is often depicted as an iterative cycle in which the same steps are (re)visited several times, improving upon the previous iteration. This is a way of preventing the following modeling pitfall:
    a. Distraction Pitfall
    b. Complexity Pitfall
    c. Implementation Pitfall
    d. Interpretation Pitfall
    e. Acceptance Pitfall every step it has iteration

5. Some authors argue that modeling is a universal skill that all people possess. Yet, you are in a course that will teach you how to model. Why is this course necessary?
    a. Professional modelers differ from general modelers because they know how to use modeling software
    b. Professional modelers look at things in new ways in hopes of seeing what no one has noticed before
    c. Professional modelers have access to data that can be used to validate the developed models
    d. Professional modelers can ensure the use of their models by following a clearly defined number of modeling steps.
    e. All of the above

6. Top-down modeling is defined by one of the authors as an approach that does not require an hypothesis Which other modelling approach will fit this description:
    a. Data-driven modeling
    b. Agent-based modeling bottom up
    c. Individual based modeling bottom up
    d. Statistical modeling
    e. None of the above

Answer sheet

Question 1:

[A] [B] [C] [D] [E]

Question 2:

[A] [B] [C] [D] [E]

Question 3:

[A] [B] [C] [D] [E]

Question 4:

[A] [B] [C] [D] [E]

Question 5:

[A] [B] [C] [D] [E]

Question 6:

[A] [B] [C] [D] [E]