Perus funktiönaskin (ei graaffinen/ohjelmointa) sallittu tentissä.
Basic Scientific calculator (no graphing/programmable) accepted in exam.

BME-2706 Analysis of bioelectric phenomena
Exam 14.2.2011 at 9.00-12.00

Maximum number of points from each essay is 25. The entire exam is worth 100 points. You may also include figures to support your text. You may enhance your figures from the book with labels, arrows, circles, etc in order to clarify your text. Remember to budget your time wisely.

1) Please explain the significance and importance of the reciprocity theorem as it applies to the field of bioelectromagnetism.

2) Are the electric and magnetic signals originating from the same tissue independent, partially dependent, or dependent? Please explain your answer.

3) Explain all blocks/sections of Figure 7.9 (page 145) from the textbook.

Title: SOLUTION OF THE INVERSE PROBLEM WITH THE MODELING METHOD

Block 1 A MODEL IS CONSTRUCTED FOR THE SOURCE
The model should have a limited number of independent variables

Block 2 A MODEL IS CONSTRUCTED FOR THE VOLUME CONDUCTOR
The accuracy of the conductor model must be as good as or better than that of the source model

Block 3 AT LEAST AS MANY INDEPENDENT MEASUREMENTS ARE MADE AS THE SOURCE MODEL HAS INDEPENDENT VARIABLES
Now we have as many equations as we have independent variables and the source model may be evaluated

Block 3.5 BUT NOW WE HAVE A NEW QUESTION, NAMELY:

Block 4 HOW WELL DOES THE CONSTRUCTED MODEL REPRESENT ITS PHYSIOLOGICAL COUNTERPART?

Fig. 7.9 Solution of the inverse problem based on the modeling method.

4) Describe the two different classes of EEG inverse solution methods, based on the selection of the source model. Mention their advantages and disadvantages. Will the source localization accuracy increase by increasing the number of EEG electrodes? Reason out your answer.