Math115 Test 4

March 22, 2007

Answer all questions and give complete reasons and checks for your answers. The parts of the questions are weighted as shown spend an appropriate amount of time on each part. The questions can be answered in any order, please start a fresh sheet of paper for each question.

1. (a) Show algebraically that there is no straight line which passes through all of these points. [3]

x_i	1	3	2	-1
y_i	3	1	3	-3

   (b) Find the best fit straight line through the points. [5]

   (c) Calculate the differences between the values of y on the straight line with the y_i values and identify which y_i is closest to the line. [2]

2. (a) Two sequences are related as follows:

$$a_{n+1} := 28a_n - 15b_n , \quad b_{n+1} := 50a_n - 27b_n , \quad a_0 = 2 , \quad b_0 = 1$$

   Find a_1 and b_1 using the recurrence relations. [1]

   (b) Use diagonalisation to find the values of a_i and b_i and determine what ratio $\frac{a_i}{b_i}$ approaches. [9]