

## Computing in the Arts Exam 2009

*Don't spend too much time on any one question. Ensure that your answers give enough detail that it's clear that you understand the material, even if you find yourself with too little time to complete all the details.*

*Questions 1 – 6 carry equal weight.*

1. Suppose you've been given the six words, "cats", "clouds", "jump", "feel", "lazily", "pink", and have been asked to write a stochastic poem using only those words. Describe briefly but precisely how this could be done, giving a short example. If you were asked to use a similar approach to write a poem in the style of Yeats, describe briefly and carefully how you would do this.
2. Give a definition of a group and a subgroup, and indicate what is meant by Abelian. Describe the symmetry group of a regular hexagon, using its subgroup structure to explain what's going on.
3. Suppose you needed to write a Java program to draw a blue rectangle (twice as long as it is high) with yellow diagonals on a background having vertical black pinstripes (regularly spaced 10 pixels apart). Give the code for the actual drawing part (you may assume that all the other necessary code for the program has been provided for you).
4. Sketch a picture of the hyperbolic plane and draw a triangle in it having only one vertex at infinity. Can this be used to tessellate the entire plane (explain any conditions that might have to be satisfied)? Sketch four further triangles obtained from your first one by reflecting across various sides. How could this approach be extended to three dimensions?
5. Given the following tune fragment, describe carefully and with sufficient detail a process for a machine to harmonise it automatically, and write in the resulting harmonisation on the score.

The image shows a musical score fragment in 4/4 time, treble clef. The melody consists of the following notes: C4 (quarter), D4 (quarter), E4 (quarter), F4 (quarter), G4 (quarter), A4 (quarter), B4 (quarter), C5 (quarter), B4 (quarter), A4 (quarter), G4 (quarter), F4 (quarter), E4 (quarter), D4 (quarter), C4 (half). The score is written on a grand staff with a treble clef and a 4/4 time signature. The melody is written on the upper staff, and the lower staff is empty.

6. If there's a topic you'd prepped for this exam which was discussed in class but is not in the previous five questions, give a brief account of it.
7. Very briefly, describe the project you're working on and list your group members (if any).