THIS PAPER IS NOT TO BE REMOVED FROM THE EXAMINATION HALLS

UNIVERSITY OF LONDON **CO3346 ZA**

BSc Examination

CREATIVE COMPUTING

Sound and Music

Date and Time: Friday 5 May 2017: 14.30 - 16.45

Duration: 2 hours 15 minutes

There are FOUR questions in this paper. Candidates should answer **THREE** questions. All questions carry equal marks, and full marks can be obtained for complete answers to a total of **THREE** questions. The marks for each part of a question are indicated at the end of the part in [.] brackets.

Only your first THREE answers, in the order that they appear in your answer book, will be marked.

There are 75 marks available on this paper.

A handheld calculator may be used when answering questions on this paper but it must not be pre-programmed or able to display graphics text or algebraic equations. The make and type of machine must be stated clearly on the front cover of the answer book.

Question 1 Algorithmic composition

(a) What is the difference between algorithmic composition and conventional composition? [4]

(b) List **THREE** examples of software systems that are used by algorithmic composers. [3]

(c) Why would a composer use a specialist environment such as those you listed in the previous answer, instead of a standard programming language such as Java? Give three clear reasons. [3]

(d) Swarm music is a method of algorithmic composition that can be used in real time. Such systems are sometimes referred to as 'live algorithms'. Discuss **TWO** of the **FOUR** key properties of live algorithms stated in the study guide. [5]

(e) A composer creates an autonomous music generating system that plays a note every time a car drives past her window. The note depends on the speed of the car. Faster cars play higher pitched notes. Discuss whether this system has the two properties you listed in the previous answer. [5]

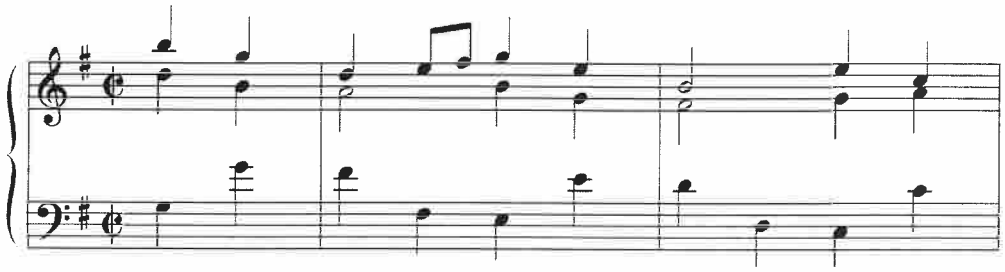
(f) Compare jazz style improvisation and western classical music. Which one is swarm music closer to and why? [5]

Question 2 Musical Interaction

(a) Describe **FOUR** musical characteristics of western tonal music that are used to organise its structure. [8]

(b) What is meant by metrical hierarchy? [2]

(c) Consider the following score:



Draw a set of dots that represent the metrical hierarchy in this piece. [5]

(d) Describe informally the method you would use to estimate where the pulse falls in the piece of music above (think of the pulse as being where someone would tap their foot when listening to the music). [4]

(e) Write a step by step description of the process you described in the previous question that could potentially be turned into code. [6]

Question 3 Music Information Retrieval

(a) List **THREE** typical tasks in MIR and explain why each is a useful thing to be able to do. [6]

(b) For one of the examples you list above, describe the data input, how it might be processed to achieve this functionality and the data output, noting if it involves meta data or content data. [6]

(c) This question concerns the problem of assigning genre labels to musical recordings.

i. This problem can be addressed using a clustering approach. In this context, what is in a cluster? [2]

ii. What data can be used to describe members of a cluster? What does that data tell you about that cluster member? [3]

iii. How are different clusters differentiated? [2]

iv. How is a piece of music assigned to a cluster? [3]

v. Describe a problem with assigning genres to pieces of music. [3]

Question 4 Pure Data

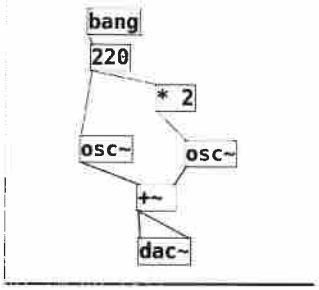
(a) A musician asks you what the Pure Data software is for and how it works. List **THREE** things you would say in response. [6]

(b) Pure Data has some objects that run at control rate and some that run at audio rate. What is the difference between these **TWO** types of object?

[4]

(c) Give an example of a control rate object and an audio rate object. [2]

(d) Draw the waveform you would expect to hear coming from the computer when you click the bang in this Pure Data patch. Label the axes.



[5]

(e) Describe the principle behind FM synthesis and explain why it can be considered a computationally efficient way to generate timbres. [3]

(f) Draw a PD patch that implements FM synthesis. Annotate the patch to show the range of values that would come out of the audio objects. [5]

END OF PAPER