

Department of Computer Science, N.U.I. Maynooth
CS151 – Discrete Structures 1
Class Test 3
Thursday 8 December 2005, 13:00

Instructions:

1. Remove all notes, books, blank paper, and electronic devices from your desk. Blank paper will be provided if you need it.
2. Write your name, student number, and course below
3. Write your answers in each of the spaces provided (check both sides of page)
4. You have 45 minutes for this test. Hand this script to the invigilator before you leave and make sure to sign the attendance sheet when you do so. This will verify that you actually handed up a script if for some reason it goes missing.

Name: _____

Student number: _____

Course (Arts, CSSE, Finance, Venture Mgt., Music Tech., etc.): _____

1. Let $A = \{\text{car, bicycle, airplane}\}$, and let $B = \{0, 1\}$. Write out the elements of the relation $A \times B$. In these and all other questions make sure to take care with your brackets/parentheses/etc. **[5 marks]**

$A \times B =$

2. Write out the elements of the relation $\{c, b\} \times \{\emptyset\} \times B$. **[3 marks]**

$\{c, b\} \times \{\emptyset\} \times B =$

3. Let C be a function that is a subset of $A \times B$. Give one possibility for C . **[3 marks]**

$C =$

4. Let f be of the form $f: \mathbf{Z} \rightarrow \mathbf{Z}$, where \mathbf{Z} is the set of integers, and let f be defined as $f(x) = 3x - 11$. Write out two different elements of the relation f . **[4 marks]**

_____ is an element of f

_____ is an element of f

(more questions overleaf)

5. Let g be of the form $g : \mathbf{Z} \rightarrow \mathbf{Z}$, where \mathbf{Z} is the set of integers, and let g be defined as $g(x) = x$ if $x \geq 0$ then x else $-x$. Write out the values of the following function compositions. **[6 marks]**

$$f(f(g(f(g(21)))) =$$

$$g(f(g(g(f(0)))) =$$

6. Define a function $b: \mathbf{Z} \rightarrow \mathbf{Z}$ as some composition of functions f and g , such that $b(0) = 44$. **[2 marks]**
