NUI Galway
OÉ Gaillimh

Semester I Examinations 2020/2021
SAMPLE – NOT EMBARGOED

Exam Code(s)	1MAI1, 1CSD1, 1SPE1, 2SPE1
Exam(s)	MSc in Computer Science (Artificial Intelligence), MSc in Computer Science (Artificial Intelligence) - Online
Module Code(s)	CT5132, CT5148
Module(s)	**Programming and Tools for Artificial Intelligence**
Discipline	School of Computer Science
Paper No.	1
External Examiner	Prof. Pier Luca Lanzi
Internal Examiner(s)	Prof. Michael Madden
	Dr. James McDermott *
Programme Coordinator(s)	Dr. Matthias Nickles, Dr. James McDermott
Instructions	**Answer all 4 questions. All are worth equal marks.** You may answer either: in a Word document or similar, and then `CT5132_CT5148_PTAI_Answer_Sheet.docx` is suggested; or on paper, uploading a scan of the pages. This is an **open-book** exam: you may **read** textbooks, notes, and **existing resources** on the internet. You may **not communicate** with anyone, in person, via phone, internet, or otherwise. You may **not post questions** on internet sites or elsewhere during the exam.
Duration	2 Hours exam plus 30 minutes for upload
Number of pages	3 (including this page)
Discipline	Computer Science
Requirements	
Release in Exam Venue	Yes ☒ No ☐
Release to Library	Yes ☒ No ☐

Question 3: Data Science

(a) In your own words, explain the benefits of a *vectorised* style of programming for data science. **[5]**

(b) Rewrite the following code in a vectorised style. **[5]**

```
xs = c(4, 1, 6, 2, 9, 10)
y = 0
for (x in xs) {
  if (x %% 2 == 0) {
     y = y + x
  }
}
```

(c) In your own words, what is the main difference between a Scikit-Learn classifier and regressor? **[5]**

(d) The following data is not *tidy*. Explain why not, and show what it would look like in tidy format. **[5]**

Country	Metric	2019	2020
Ireland	Population	5.1	5.2
	GDP	101	102
France	Population	71	72
	GDP	400	410

(e) Suppose we have two dplyr tibbles named `rentals` and `customers`, as shown below. Notice that not every customer ID has an entry in the `customers` table. Write a dplyr join to create a tibble containing all rentals together with the corresponding names and addresses. Names and addresses should be blank wherever they are not available. **[5]**

Rentals table

Date	Movie ID	Customer ID
01-Jan	102	1
02-Jan	101	2
02-Jan	102	3
05-Jan	103	1
05-Jan	104	7

Customer table

Customer ID	Name	Address
1	Bob	11, Haight St
2	Frida	Oxford Circus
3	Carrie	99, Fifth Ave