University College Dublin
An Coláiste Ollscoile, Baile Átha Cliath

SEMESTER I EXAMINATION – 2011/2012

COMP 41100

Exploring Programming in Ruby

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Time allowed: 2 hours

Instructions for candidates

Answer any FIVE Questions. All Questions carry equal marks.

Use of calculators is prohibited.

Instructions for invigilators

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1. Given the following array: [0, 1]
   create two methods to generate the next 20 Fibonacci numbers in the sequence such that (i) one method generates the sequence using iteration and (ii) one method generates the sequence using recursion.

2. Define three classes called `Furniture, Chair and DesignerChair` each with, at least, four attributes (some of which should be inherited). `Chair` should be a sub-class of `Furniture` and `DesignerChair` should be a sub-class of `Chair`.

   Create three methods for each class, such that the `DesignerChair` sub-class inherits, at least, one distinct method from each of the classes above it.

   What is a mixin? How might you create a mixin using one or more of the above three classes; illustrate your answer with relevant code. Why does Ruby use mixins?

3. Write an iterative method – `insert_blah` – that will take an array of strings (of any arbitrary length), such as:

```
["marky", "had", "a", "blah" ,"lamb"]
```

   that will add "blah" to all element-strings in the array, except for any string that already contains "blah" (they should be left as they are). So, the method should return the modified array, for example:

```
["markyblah","hadblah","ablah","blah","lambblah"]
```

   Now, define a method that does the same thing using `sub` or `gsub`.

   Now define a method that will return the array as an array showing the number of characters in each string-element of the array; for example, when dealing with the above original array it should return:

```
[5, 3, 1, 4, 4]
```

4. Write a short explanatory paragraph on any ***four*** of the following, using appropriate examples: polymorphism, data abstraction, duck typing, modularity, inheritance in OOP.

5. Ruby on Rails makes use of the Model-View-Controller architecture pattern to organize the development of web-based applications. What are models, views and controllers? Write a short explanatory paragraph on each. Give three reasons why it might be a good idea to divide up web-based applications in this way.

6. Write a simple program that reads in the following students.csv file:

```
"name","surname","age","height","footsize"
"jim","oshea",21,"6.2",45
"mary","twiggins",20,"5.2",32
"barry","unxtious",25,"5.9",40
"todd","arkingtonworth",19,"4.2",30
```

and then returns the following three outputs from it: (i) an array of the first names of the people in the file, (ii) a value that is the mean age of the people in the list, (iii) a value that is the sum of the heights of the people. Note, the solution should be one that works for any a .csv file with any arbitrary number of entries in it.

7. What do the following evaluate to in Ruby:

i. `puts "hammy hamster"`

ii. `a = "foo"; p a`

iii. `["a","b","c].instance_of?(String)`

iv. `["a","b","c"].instance_of?(Array)`

v.
```
class OddClass
end
p OddClass.new
```

vi. `[1,2,3].collect {|x| x – 1}`

vii. `["a","b","c"].each{|item| puts item + 2}`

viii. `["a1","b2","c3"].select {|item| item[1] == 2}`

ix. `[[2,3],[[[3]],[4,5]]].length`

x. `[1,2,[3,4],4,2,[[3,[6,2,1]]],145,4,3,2].flatten`

xi. `Array.new`

xii. `["fooington"].concat("barrington")`

xiii. `["foowich"].concat(["barwith"])`

xiv. `a = ["foowich"]; a << ["barwith"]; p a`

xv. `"fooblinggg".chop.chop.chop`

xvi. `baDDarT.downcase`

xvii. `"apples,oranges,lemons".split(/,/)`

xviii. `"1234" <=> "12345"`

xix. `Regexp.new("floppy")`

xx. `“two” + 2 + “ equals” + “ 4”`