

218 test 9th March 2010

Name

Student Number

Sign the pledge: I did not give or receive any kind of aid or cheat during this test...

_____ don't write anything below this line _____

Question	1	2	3	4
Out Of	33	33	33	1
Grade				

1.

The Society for Circus Animal Management wants to create some software to help them keep track of all of the circus animals in the country. Unfortunately, they don't know how to do it, so you have got the job.

The information to be recorded for each animal is:

- its name,
- its species,
- the price that was paid for it,
- its IQ,
- the number of customers that it has eaten.

a

Define a class that could be used to represent a circus animal.

b

Define a suitable constructor.

c

Define a method called `print` which displays all the relevant information.

d

Define a method that returns the efficiency of a circus animal.

(that is of course the number of people it has successfully eaten, divided by its price).

e

Create an array that can store the information for 1,000 circus animals, and show what you would do to store these two animals in the array:

- Roger the \$75 hippopotamus, IQ 84, no customers eaten,
- Angela the \$200 zebra, IQ 107, two customers eaten.

f

Write a function that searches the whole array and returns as its result the name of the most intelligent gorilla.

2.

The society has decided that the animals should be stored in a linked list instead of an array.

a

Define a class (or classes) suitable for holding a linked list of circus animal information.

b

Define any appropriate constructors.

c

Define a method that allows a circus animal to be added to the linked list.

d

Define a method that is given a name and species as parameters, and searches the linked list for an exact match. It should return true if a match is found, and false otherwise.

e

Because of government regulation, it is necessary to produce a linked list of all known gorillas. Write a method or function that takes a linked list as its parameter, and returns as its result a new linked list containing only the gorilla records. The gorillas should not be removed from the original list, just collected together in a new one.

3.

a.

Vectors and linked lists both provide flexibly-sized storage for data, and sometimes it is difficult to decide which would be the best to use. Tell me one kind of operation where a vector gives much better performance than a linked list, and briefly explain why.

b.

This function is supposed to make a copy of an array. Tell me what is wrong with it, briefly explain its main faults (that is, tell me *why* it is wrong), and correct it.

```
int [] copyarray(int original[])
{ int size = sizeof(original);
  int copy[size];
  for (int i=1; i<=size; i+=1)
    copy[i] = original[i];
  return copy[]; }
```

c.

In C++, what is the difference between `struct` and `class`?

4.

Draw a picture of Roger the Hippopotamus from question 1. If it makes any difference to you, He is feeling a bit worried about a test this afternoon, and has forgotten that he doesn't own a bicycle.