QUEEN MARY, UNIVERSITY OF LONDON
DCS/115 INTRODUCTION TO PROGRAMMING

Class Test Monday 20th November 2000 10.05-10.55

Please fill in your name here: .....

College registration number here: .....

Department email here: ..... Course Code (e.g G500) here: .....

All answers to this test should be written on the test sheet, but you may use spare paper for rough working, or the space on the back page if you cannot fit your answers into the space provided. Answer as many of the questions as you can. This is an "open book" test: you are allowed to access your notes and textbook.

1) Explain in the spaces given what is meant by:

a) "Compiler" with regards to Java

b) "Aliasing" caused by assignment in Java

c) "Short-circuit" with the `&&` operator

d) "Scope" with regard to variables in Java

2) In each of the cases below, write what would be printed when the fragment of Java code is executed (assume we have the declaration `int a, b, c`):

a)
```
a=22;
b=10;
c=3;
System.out.println(a-b/c);
```

---

b)
```
a=7;
b=2;
b*=a+1;
System.out.println(b);
```

---

c)
```
a=5;
b=20;
c=b-a-3;
System.out.println(++c);
```

---

d)
```
a=2;
b=5;
c=a>b?b*a:b-a;
System.out.println(c);
```

---

e)
```
a=9;
b=a--;
c=a;
a=b*2;
System.out.println(a+" "+b+" "+c);
```

---

f)
```
a=8;
b=3;
double d = (double)a/b;
c=(int)d*2;
System.out.println(c);
```

---

3) Suppose we have three `int` variables, `a`, `b`, and `c`, which have been given values.

a) Write a fragment of code that will print `Yes` if `b` has a value that is in between `a` and `c` (but not equal to either) and `No` otherwise.

b) Suppose we have a method with signature `boolean hit(int force)` and a variable `punchbag` on which that method can be called. Write a fragment of Java code which calls `hit` on `punchbag` with argument `b`, until either the method returns `false` or it has been called `c` times. The variable `a` may be used to store temporary `int` values if needed.

4) A `Machine` object has the following public methods:

```
int getTemp()
void addFuel(int amount)
Grommet pushButton()
```

A `Grommet` object has a public method:

```
int getQuality()
```

A `Machine` object can be constructed with a zero argument constructor.

This represents a situation in which a machine produces grommets simulated by calling the `pushButton` method. The `addFuel` method simulates adding an amount of fuel to a machine, and the `getTemp` method simulates checking its temperature. The `getQuality` method simulates testing the quality of a grommet.

a) Write a fragment of Java code which prompts the user to enter the amount of fuel to be added, and then simulates starting a machine and adding that amount of fuel to it.

b) Write a fragment of code that simulates starting a machine and producing grommets until its temperature drops below 20, then prints how many grommets have been produced.

c) Suppose we have a variable `g` of type `Grommet` that refers to some `Grommet` object, and a variable `m` of type `Machine` that refers to a `Machine` object. Write a fragment of Java code that simulates `m` producing 100 grommets and prints how many of them were of a higher quality than the grommet represented by `g`.

Use the space below if you need any additional space to answer any of the questions.