

# Midterm One Sample

A201/A597/I210  
Spring Semester 2005

Here's the format for the midterm on Wednesday.

## Abstract

There are three parts to this exam. The first part asks a few short questions. The second asks you to write a program for which either pseudocode or a flowchart is given. The third part asks you to write a program for a problem from scratch. The exam is closed book and closed notes. Write legibly. Please sign your paper. You have two hours for the exam.

## 1 Short Questions

A. Consider the following code fragment:

```
int x = 3;
if (x > 5) {
    if (x < 10)
        System.out.print(1); }
else
    System.out.print(2);
```

Draw a flowchart that describes how the fragment runs. What happens if the curly braces are removed. Does the flowchart change? Why or why not? If the program changes draw a new flowchart to describe its new behavior. (Be careful with the indentation of the program above!)

B. Consider the following code fragment:

```
int x = 10, y = 3;
while (x >= 0 && y > 0) {
    x = x - y;
    System.out.print(x);
}
```

Explain the output it produces.

## 2 Programming

Write a program that transforms numbers: 1, 2, 3, ..., 12 into the corresponding month names: 1 will be turned into January, 2 into February, 3 into March, ..., and 12 into December.

Here's how your program might run:

```
frilled.cs.indiana.edu%java Months
Please enter a month number from 1 to 12.
2
February
frilled.cs.indiana.edu%java Months
Please enter a month number from 1 to 12.
12
December
frilled.cs.indiana.edu%java Eighteen
Please enter a month number from 1 to 12.
1
January
frilled.cs.indiana.edu%java Months
Please enter a month number from 1 to 12.
14
Exception in thread "main" [...]
```

Do not use if statements. Write your program as follows:

- Define a string of  $12 \times 10 = 120$  characters, with 10 characters for the name of each month (assume no month name is longer than 10 characters, **September** is the longest name.)
- Then when the user indicates a month number, use that number to locate the beginning of the name for that month.
- Print the substring of 10 characters that starts at that index.

As an example, the string would start like this:

```
String months = "JanuaryFebruaryMarchAprilMa...";
```

Now if the user enters 1 then you need to report

```
months.substring(0, 10)
```

and if the user enters 3 then you need to report

```
months.substring((3 - 1) * 10, 3 * 10)
```

And so on. Hope you see the general form.

### 3 Design and Programming

Write a program that

1. reads two times in military format (0900, 1730)
2. and prints the number of hours and minutes between the two times.

Here is a sample run.

```
Please enter the first time: 0900
Please enter the second time: 1730
8 hours 30 minutes
```

Your program must be able to deal with the case that the first time is later than the second time:

```
Please enter the first time: 1730
Please enter the second time: 0900
```

```
15 hours 30 minutes
```

Here's a sample run with your program:

```
frilled.cs.indiana.edu%java Fifteen
Please enter the first time: 0920
Please enter the second time: 1025
```

```
1 hours 5 minutes
frilled.cs.indiana.edu%java Fifteen
Please enter the first time: 1025
Please enter the second time: 0920
22 hours 55 minutes
frilled.cs.indiana.edu%
```

Solutions for this sample midterm will be posted here soon.