

University of Toronto
Faculty of Arts and Science
December 2005 Examinations

CSC 104H1F

Duration: 3 hours

No aids allowed

Last name:

First name(s):

Student number:

Make sure you have all 11 pages (including this page).
(Don't panic about the page count—there's lots of space for answers.)

Answer *all* questions. Answer questions in the space provided. Answers not in the correct space will not be graded unless a note in the correct space says “see page ...” and the answer on that page is clearly labelled with the question number.

Be careful not to get stuck on some questions to the complete exclusion of others. The amount of marks or answer-space allotted does not indicate how long it will take you to complete the question, nor does the size of the answer-space indicate the size of the correct answer.

Do not open this booklet until you are instructed to.

Do not write anything in the following table:

question	value	grade	question	value	grade
1	9		6	12	
2	6		7	15	
3	6		8	15	
4	4		9	13	
5	10		10	10	
subtotal			total	100	

1. [9 marks]

Suppose that you are writing a procedure to tell someone how to go to the CDF computer labs. The procedure says that they can go to either BA 2220 or BA 3175.

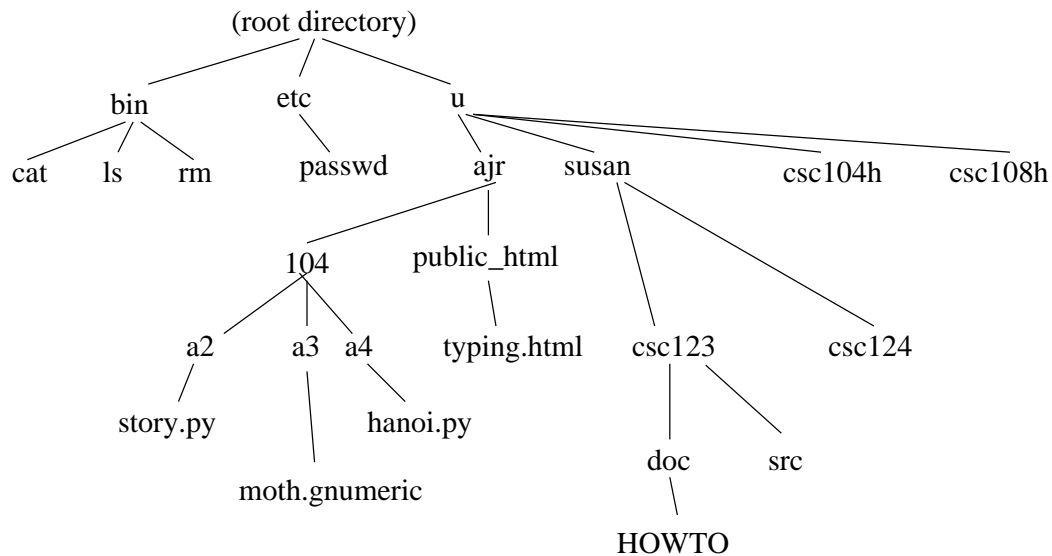
a) What about that instruction disqualifies this procedure from being called an “algorithm”? Why?

b) Why is this defect in the procedure harmful if we were trying to build a robot or other computational device to follow this procedure?

c) How could we modify the procedure so as to be a valid algorithm?

2. [6 marks]

Consider the following filesystem hierarchy:



a) Write an absolute path name to specify susan's file "HOWTO".

b) Suppose that I have just logged in and my (ajr's) home directory is my "current working directory". Write a relative path name for me to specify my "typing.html" file.

c) If this is my (ajr's) CDF account, specify a URL which would access that typing.html file from a web browser on any machine on the internet.

3. [6 marks]

Identify the components of this URL and their meaning:

`http://www.cdf.toronto.edu/~c5fred/moths/overview.html`

4. [4 marks]

Give an example of a situation in which you would prefer to use the KDE main menu (lower-left of the screen) to start an application program, and give an example of a situation in which you would prefer to start the program by typing its name in a terminal window.

5. [10 marks]

On the CDF computers, how do you (answer *very* briefly):

a) get to a “terminal window”?

b) start the “IDLE” IDE for Python?

c) view the contents of a (short) text file?

d) examine the list of names of files in the directory /etc ?

e) log out?

6. [12 marks]

Write HTML code to produce a web page which looks like the following. There is no available character for “ $\frac{1}{3}$ ” but there is a small picture file you can use (just as was done in assignment three for π) at <http://www.dgp.toronto.edu/~ajr/gen/13.gif>

(You can skip copying out all of the words below so long as your intention is clear.)

Vinyl Records

Vinyl records were recorded at different speeds. Standard speeds were 16, $33\frac{1}{3}$, 45, and 78 RPM.

Some people miss them, but I like CDs much better.

```
<html>  
<head>
```

```
</head>  
<body>
```

```
</body>  
</html>
```

7. [15 marks]

In a mathematics course, there are two mid-term tests, each worth 25%, plus bi-weekly homework assignments, worth a total of 10%. This yields a “term mark” worth 60%, and the final exam is worth 40%. However, if you do better on the final exam than on the term work, then the final exam counts for 100%.

Here is a grades spreadsheet for a single student:

	A	B	C	D	E	F	G
1	MAT 123F						
2							
3	Last name:	Simpson					
4	First name:	Lisa					
5	Student #:	5					
6							
7	Item	Grade	Out of		Homework assignments out of 10 each		
8	Test 1	39	40		Sept 16	9.5	
9	Test 2	26	50		Sept 30	8	
10	Final exam	83	100		Oct 14	8.5	
11					Oct 28	7	
12	Total term tests out of 50:		37.375		Nov 18	6	
13	Total homework out of 10:		7.75		Dec 2	7.5	
14	Term grade out of 60:		45.125		total	46.5	
15	Final grade:		83				

Write formulas for the following spreadsheet cells (all of the other cells are inputs):

F14:

C12:

C13:

C14:

C15:

8. [15 marks]

a) Write a Python program to print the integers (whole numbers) from 10 to 20, inclusive, using a loop.

b) Write a Python program to prompt the user for their name and then say “hello” using their name (e.g. “Hello, Alan”).

c) What does the following Python program output?

```
x = 3
y = x + x
y = y + y
y = x + y
print y
```

d) What does the following Python program output?

```
x = 2
while x < 30:
    x = x * 5
print x
```

e) What does the following Python program output?

```
for i in range(2,5):
    print 'z' * i
```


9. [13 marks]

a) Convert the following base ten numbers to binary.

28

7

b) Convert the following binary numbers to base ten.

10010

10101

1110

c) In assignment four's "Hanoi" program, the binary representation of the number controlled which disk was moved. Which disk would be moved for each of the numbers in part b?

10010

10101

1110

10. [10 marks]

(Note: This question is the A+ question: very difficult for most students. Do the rest of the exam first!)

We can *factor* a number by repeatedly finding the lowest integer (starting from two) which divides evenly into it, printing that number, dividing by it (i.e. $x = x / d$), and repeating until we're left with 1.

For example, let's factor the number 12.

2 divides evenly into 12, so print 2, and then $x = 12 / 2$, i.e. x is now 6, and repeat.

2 divides evenly into 6, so print another 2, and $6/2$ is 3, so repeat with 3.

2 does not divide evenly into 3. 3 divides evenly into 3. So print 3, and $3/3$ is 1, so we're done.

So the "prime factorization" of 12 is $2 \times 2 \times 3$.

Another example: factor the number 15.

2 does not divide evenly into 15. 3 does. So print 3, and $15/3$ is 5, so repeat with 5.

2 does not divide evenly into 5. 3 does not divide evenly into 5. 4 does not divide evenly into 5. 5 does divide evenly into 5. So print 5, and $5/5$ is 1, so we're done.

So the prime factorization of 15 is 3×5 .

Write a program which factors an input number. You can assume that the number is a positive integer. (Print the factors as you go; there is no need for a summary statement at the end.) Continue over the page if necessary.

(This question is intended to be fairly difficult; I think that not all students will be able to complete it.)

Extra space if needed
(you must write “see page 11” in the usual answer space for the given question)

End of exam. Total marks: 100. Total pages: 11.

CSC 104H, December 2005, page 11 of 11