CSI 1100 / 1500 Midterm Test

Wednesday October 27, 2004

Professors: Daniel Amyot, Alan Williams

Duration: 80 minutes

Instructions: Please read carefully!

1. **Complete all sections of the identification area in ink.**
2. This is a closed-book test. **No books, papers, calculators or other electronic devices are permitted.**
3. There are four questions on this test. Answer all four questions on the question sheet in the area provided. **Questions answered in pencil will not be re-graded even if there is a marking error.**
4. The marks allocated to each question are indicated. Not all questions are worth the same amount, so plan your time accordingly. The midterm will be scored out of 40 marks, which represents 20% of your final grade.
5. Algorithms are to be described using the pseudocode format from the lectures and the notes.
6. You can use the back of the question sheet pages, or page 7, for calculations and other work. Pages 7 and 8 can be detached as they will not be marked.
7. Les réponses en français sont acceptées.
8. Peeking at your neighbours' work may be cause for expulsion from the exam.

Identification:

Name: _____

ID number: _____

Good luck! ☺

For use of grader:

Question	Marks available	Marks received
1	12	
2	6	
3	10	
4	12	
Total	40	

Question 1 (12 marks total – 4 marks for each part)

Part a)

What is printed by the following Java program? Circle the letter next to the correct output.

```
int s;
int r;
int i;

int [] x = {4, 8, 2, -9, 6};
s = 1;
r = 0;
i = x.length - 1;

while (i > 0)
{
   s = s * -1;
   i = i - 1;
   r = r + s * x[i];
}

System.out.println(r);
```

a) -13

b) 20

c) -9

d) -21

e) 11

f) 7

Part b)

The array of integers `"a"` (type `int`) initially contains `{1, 3, 8}`. Only **one** of the following Boolean expressions evaluates to `false`. Circle the letter next to the expression that evaluates to `false`.

a) `(a[1] < 3) || ( (a[1] / 2) == 1)`

b) `!( (a[0] % a[2]) == (a[0] % a[1]) )`

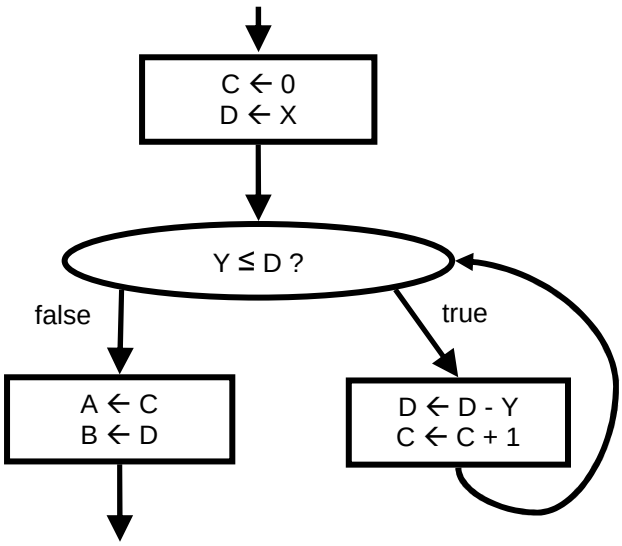
c) `!(!(false) && (a[2] < a[1]) )`

d) `Math.pow(a[1],2) > a[2]`

e) `Math.abs(a[0] - a[1] + 2) <= 0`

Part c)

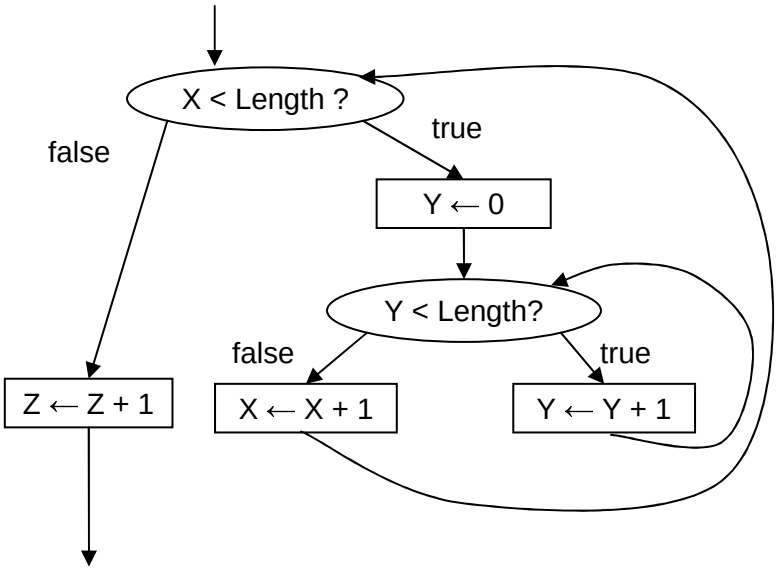
Suppose that X and Y are given integers; C and D are intermediates; A and B are results. What will the values of A and B at the end of this algorithm, if the initial values are X = 8 and Y = 3?



A = _____ B = _____

Question 2 (6 marks in total – 3 marks for each part)

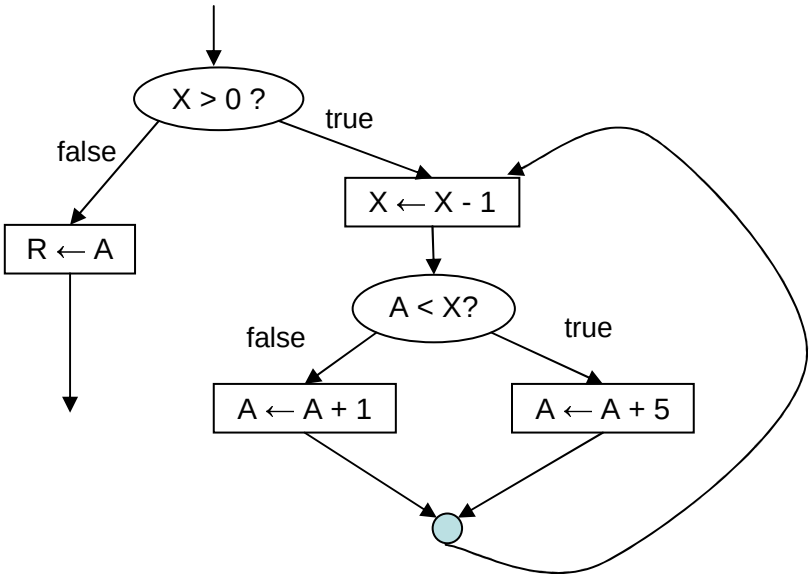
Part a): Briefly, this translation of an algorithm body diagram is incorrect because …




```
while ( x < length )
{
   y = 0;
   if ( y < length )
   {
      y = y + 1;
   }
   else
   {
      x = x + 1;
   }
}
z = z + 1;
```

Answer :

Part b) Briefly, this algorithm body diagram is incorrect because …



Answer :

Question 3 (10 marks)

Translate the algorithm found in appendix A on page 8 to a Java program by completing the partially filled `main( )` method below. You do not need to add an identification section to the program.

```
public static void main( String[] args ) throws IOException
{
   // DATA DICTIONARY









    // READ IN GIVENS
   System.out.print( "Enter an array of integers: " );
   x = CSI1100.readIntLine( );

   n =

   System.out.print( "Enter a limit value: " );
   v = CSI1100.readInt( );
   // ALGORITHM BODY
```

```
   // PRINT OUT RESULTS AND MODIFIEDS
   System.out.println( "The result is: " + exceeds );
}
```

Question 4 (12 marks)

The Canadian income tax system has a set of tax brackets, such that if a person's income is greater than or equal to the lower limit of the bracket, and less than the upper limit of the bracket, the person is contained in the tax bracket.

Suppose that you are given the upper and lower limits for a single tax bracket for a particular year, and an array "Income" of length "NPeople" where each value in the array is the annual income for some person. Write an algorithm to determine the percentage of people who have incomes within the tax bracket.

This page is for calculations and other work (you can detach this page; it will not be marked)

Appendix A: Algorithm for Question 3 (you can detach this page)

GIVENS:	X	(an array of integers)
	N	(number of elements in the array X)
	V	(a limit value)
INTERMEDIATES:	Index	(index for array X from 0 to N-1)
	Sum	(sum of the values in the array)
RESULT:	Exceeds	(Boolean: True if Sum > V and false otherwise)

HEADER: Exceeds ← SumExceedsV(X,N,V)

BODY: