CS2104 – Programming Languages
School of Computing
National University of Singapore

October 4, 2012

Problem Set 5

Semester 1, 2012/13

Due: ***October 14, 23:59***

Marks: 6

Submission: In IVLE, in the cs2104 workbin, you will find a folder called "`Homework submissions`". In that folder, there are currently 2 ***subfolders:*** **`PS6P01`**, and **`PS6P02`**. The last two digits of the folder name indicate the solution that is to be submitted into that folder: the solution to *Question 1* into **`PS6P01`**, and so on (that is, you need to submit 2 separate solutions to 2 problems). A solution should consist of a ***single text file*** that can be compiled, or loaded into the interpreter of interest and executed. You should provide as much supplementary information about your solution as you can, ***in the form of program comments***. Moreover, if you work in a team, state the members of the team at the beginning of the file, in a comment. You do not need to submit the same file twice, one submission per team is sufficient.

Problem 1 [2 marks, submit to `PS6P01`]

Complete the following Haskell function so that it complies to the specification given below.

```
split = foldr         -- only fill in at the indicated place,
         (\ x y ->    -- do not change anything else in the skeleton

             -- .... < your code here > .....

         [[]]
```

The function `split` must split a list of numbers into positive and negative segments. The following is a possible interaction for split:

```
ghci> split [1,2,3,4,-1,-2,-3,4,3,4,2,-5,-4,-3,-3,-2,-1,10]
it:- [[1,2,3,4],[-1,-2,-3],[4,3,4,2],[-5,-4,-3,-3,-2,-1],[10]]
```

In completing the function, only add code at the specified position. Do not change anything else in the skeleton of the function.

Problem 2 [4 marks, submit to PS6P02]

Consider the following C program:

```
#include <stdio.h>

// builds a string showing the sequence of moves that
// solves the towers of hanoi puzzle -- moving all discs
// from peg 'a' to peg 'b' using peg 'c' as aux
// n is the number of discs, and assumed to be less than 10
void hanoi(char ** p, int n, int a, int b, int c) {
   if ( n == 0 ) return ;
   hanoi(p,n-1,a,c,b) ;
   **p = '0'+(char)a ;
   (*p) ++ ;
   **p = ' ' ;
   (*p) ++ ;
   **p = 't' ;
   (*p) ++ ;
   **p = 'o' ;
   (*p) ++ ;
   **p = ' ' ;
   (*p) ++ ;
   **p = '0'+(char)b ;
   (*p) ++ ;
   **p = '\n' ;
   (*p) ++ ;
   hanoi(p,n-1,c,b,a) ;
}

int main() {
  char a[1000] ;  // string buffer
  char *p = a ;   // current position in string
  hanoi(&p,4,1,2,3) ; // build the string of moves for 4 discs
  *p = '\0' ;     // terminate the string
  // printf(a) ; // string could be printed, but not in VAL code
}
```

The program builds a string which, when printed, lists the sequence of moves for the tower of hanoi puzzle with 4 discs, moving all discs from the first peg to the second peg, using the third peg as an auxilliary. Translate the above program into VAL.