CSCI 132 Practical Unix Programming
Homework 1
Due 09/12/07

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PART 1

This part is to help you access your account, change your password, get familiar with the Unix operating system, and write your first Perl program.

- Log in using your user name and the default password hunter1.

- Open a terminal window. To do this, right click on the desktop and choose terminal from the popup menu.

- The terminal window provides you with a command prompt. Change your password using the passwd command. At the command prompt type passwd. This will ask you to enter your old password, hunter1, and provide your new password. Once your password is successfully changed, this is the password that you will use for future logins.

- Change directory to Desktop by typing: cd Desktop

- Create a directory (folder) under the Desktop directory called csci132. This directory will hold the Perl code files. To create this directory type: mkdir csci132. You should observe a new icon folder created on your desktop.

- Change directory to csci132.

- Create a file called first.pl in this directory. To do this, use the command touch, type: touch first.pl

- Open the file just created (empty file) with the text editor emacs. Type emacs first.pl &

- Write your first Perl program, you can choose any of the programs we did in class. Save the file by choosing save from the File menu, or simply pressing Ctrl X S (Hold the Control key then press X followed by S).

- To run the program, at the command prompt type: perl first.pl

PART 2

The Pascal triangle is the following:

```
              1
           1     1
         1    2    1
       1    3    3    1
     1    4    6    4    1
   1    5   10   10    5    1
 1    6   15   20   15    6    1


           .
           .
           .
```

Let $P_{i,j}$ refer to the entry of the Pascal triangle in the ith row and the jth column. Rows and columns are indexed starting at 0. For instance $P_{0,0} = 1$, $P_{4,2} = 6$, $P_{5,0} = 1$, and $P_{6,4} = 15$ (the secon 15 on row 6).

You need to write a program that, given i and j, computes the entry $P_{i,j}$ of the Pascal triangle. You program should look like:

```
$i=...; # initialize i with some value
$j=...; # initialize j with some value

# the rest of the program
```

Here are some hints on how to do this:

- First, you need to check whether the values of i and j are consistent with the Pascal triangle; for instance, the entry $P_{3,4}$ does not exists. You will need to use an if else statement of the form:

  ```
  if ( . . . ) {

     . . . ;
     . . . ;

  } else {

     . . . ;
     . . . ;

  }
  ```

  If the values of i and j are not consistent, you may print an error message like "j must be less or equal to i".

- $P_{i,0} = 1$ regardless of the value of i

- You will need to use a loop based on the following observation:

$$P_{i,j} = \frac{i - j + 1}{j} \cdot P_{i,j-1}$$

Here's an example:

$$P_{5,0} = 1$$

$$P_{5,1} = \frac{5 - 1 + 1}{1} \cdot 1 = 5$$

$$P_{5,2} = \frac{5 - 2 + 1}{2} \cdot 5 = 10$$

$$P_{5,3} = \frac{5 - 3 + 1}{3} \cdot 10 = 10$$

$$P_{5,4} = \frac{5 - 4 + 1}{4} \cdot 10 = 5$$

$$P_{5,5} = \frac{5 - 5 + 1}{5} \cdot 5 = 1$$

Therefore, you need four variables:

- i and j to specify the entry

- p to keep track of a product

- count to represent a counter to be used in the condition of the loop (condition must compare count and j)

Finally, your program looks like:

```
$i=...;
$j=...;

$p=...;
$count=1;

if ( . . . ) {
  print ''j must be less or equal to i'';
} else {
  until ( . . . ) { # or use while and reverse condition
    #update product
    #update counter
  }
  print $p;
}
```