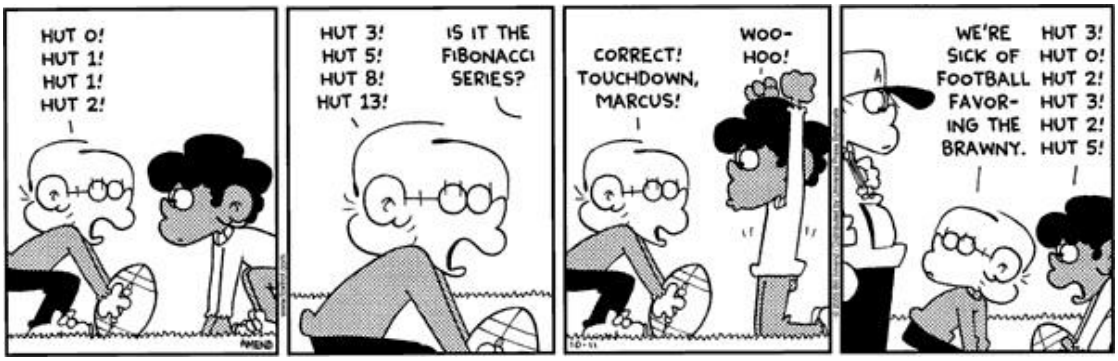
LASTNAME, FIRSTNAME (in capital letters):

_____

Section: _____ Date Submitted:

COMPRO1 Recursion Exercise



The above cartoon (Amend 2005) shows an unconventional sports application of the Perrin sequence (right panel). (The left two panels instead apply the Fibonacci numbers).

Source: http://mathworld.wolfram.com/PerrinSequence.html
Amend, B. "FoxTrot.com." Cartoon from Oct. 11, 2005. http://www.foxtrot.com/.

I.

II.

III.

TOTAL:

/41

I. Perrin Sequence [11 points]

The Perrin sequence is an integer sequence defined by the recurrence

$$P(n) = P(n-2) + P(n-3)$$

where $P(0) = 3$, $P(1) = 0$, and $P(2) = 2$. Implement the **Perrin** function in C language [10 points].

```
int
Perrin(int n)
{




}
```

Example Calls:

```
printf("%d", Perrin(0)) will print 3
printf("%d", Perrin(1)) will print 0
printf("%d", Perrin(2)) will print 2
printf("%d", Perrin(8)) will print __? // answer this part [1 point]
```

II. Greatest Common Divisor [15 points]
The greatest common divisor between two integers x and y can be computed recursively as follows:

$$gcd(x,y) = \begin{cases} x & if\ y\ is\ 0 \\ \gcd(y, x\ \%\ y) & if\ y > 0 \end{cases}$$

Implement the **gcd()** function in C [10 points].

Fill-up the 2nd column by writing the value returned by the function call specified on the 1st column [5 points].

Function call	**Returned value**
gcd(10, 0)	
gcd(0, 20)	
gcd(10, 5)	
gcd(99, 66)	
gcd(150, 250)	

III. Ackermann Function [15 points]
The Ackermann function is defined by the following recurrence relation:

$$A(x,y) = \begin{cases} y+1 & if\ x\ is\ 0 \\ A(x-1,1) & if\ y\ is\ 0 \\ A\big(x-1, A(x,y-1)\big) & otherwise \end{cases}$$

Implement the **Ackermann** function in C. [10 points]

Fill-up the 2nd column by writing the value returned by the function call specified on the 1st column [5 points].

Function call	Returned value
A(0, 5)	
A(2, 0)	
A(1, 8)	
A(2, 9)	
A(3, 1)	

*** *END OF THIS EXERCISE SET* ****

// document created by FRS