

## PROBLEMS FOR OCTOBER'09 DUE NOVEMBER 15

### 1. Pythagorus Modified

A common algebra mistake takes the form  $(a+b)^2 = a^2 + b^2$ .

For example, claiming  $(2+3)^2 = 2^2 + 3^2$  is clearly a mistake.

Note, however, that  $(2+3)^2 = (2+1)^2 + (3+1)^2$ .

Determine all values for  $m$  and  $n$  such that

$$(m+n)^2 = (m+1)^2 + (n+1)^2.$$

### 2. Averaging Digits

(i) How many *four-digit* numbers are composed of four **distinct** digits (no leading 0s), such that **one digit is the average of the other three**?

Examples: 3621 ( 3 is the average of 6,2, and 1)

5210 ( 2 is the average of 5,1, and 0)

(ii) How many such four-digit numbers with **repeated digits** are possible?

Copies available below! Feel free to take one! You can also find a copy at the Math Club website at

<http://faculty.randolphcollege.edu/ykurt/mathclub/mathclub.htm>.