
Problem of the Week

Number Six

March 13, 2017

Here's an amusing algebra trick you can use to impress your friends.

First, have your friend write down the number of the month in which they were born. (January is 1, February is 2, and so on).

Now tell them to take that number and double it, and then add 5. Then multiply the result by fifty. Tell your friend to add his or her age to the result. Then subtract 365.

For example, I was born in April and I am forty-three. So I would use 4 for the month. I would double it to 8, add five to get 13, and multiply by fifty to get 650. I add my age to get 693, and I then subtract 365 to get 328.

At this point you ask your friend to call out his or her number. If you then add 115 to that number, you can quickly call out the month they were born and their age. For example, in my case we find that $328 + 115 = 443$. The first digit is the month, and the last two digits are my age. Fun!

It's not too hard to see why this works. Let m denote the month and a denote my age. If we now follow the steps, we get the following sequence of numbers

$$m, 2m, 2m + 5, 100m + 250, 100m + 250 + a.$$

The next step was to subtract 365 and then add 115, which is the same as subtracting 250. The

result is $100m + a$. And there you have it (as long as your friend is under 100, that is).

This week's problem features a simple little equation for you to solve:

Find all ordered pairs of positive integers that satisfy the equation

$$xy + 6x - 11 = x^2.$$

As always, your answer does not count unless it comes with an explanation for how you know you found all the solutions.

When you think you have the problem figured out, follow the instructions below.

*Submissions are due to Jason Rosenhouse by 5:00 on **Friday, March 17**. Solutions, complete with a brief explanation, should be written on the back of an official POTW hand-out. Place your name, e-mail address, and the section numbers and professors of any math courses you are taking, in the **upper right corner** of the front of the page. One weekly winner will receive a five-dollar gift card from Starbucks. Solutions will be posted at the POTW website:*

<http://educ.jmu.edu/~rosenhjd/POTW/Spring17/homepage.html>