MSCS Mess

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Problem of the Week

Last week's problem came from *The Moscow Puzzles* by Boris A. Kordemsky:

Find the smallest integer such that when divided by 3, gives a remainder of 1; when divided by 4, gives a remainder of 2; when divided by 5, gives a remainder of 3, and when divided by 6, gives a remainder of 4.

Four people arrived to the correct number (58): Nathan Bishop, Thomas Hagen, Thomas Hegland, and Garett Malan.

Here is the solution from Nathan Bishop:

Let us define $B3 := \{n : n \equiv 1 \bmod 3\}$, $B4 := \{n : n \equiv 2 \bmod 4\}$, $B5 := \{n : n \equiv 3 \bmod 5\}$, and $B6 := \{n : n \equiv 4 \bmod 6\}$. The problem can then be restated as follows:
What is the smallest positive integer in the intersection of $B3$, $B4$, $B5$, and $B6$?
First, consider $B3 \cap B4$. It is clear that $B4$ modded out by 3 gives us a cyclic group of order 3 which can be described as $\{n : n \equiv 10 \bmod 12\}$. Conveniently, this set is a subset of $B6$. Proof: Let $x \in \{n : n \equiv 10 \bmod 12\}$ be given. Then $x = 12r + 10$ for some integer r. Note that $x = 3(4r) + 3 \cdot 3 + 1 = 3(4r + 3) + 1$, so $x \in B3$. Similarly, $x = 4(3r) + 2 \cdot 4 + 2 = 4(3r + 2) + 2$, so $x \in B4$, as desired.
Lastly, we must find the elements of $B3 \cap B4$ which are also in $B5$. By brute force, we see that $58 = 3 \bmod 5$ and no lesser positive integer satisfies this. Therefore the answer is 58.

REU Opportunities

What does it mean to do research in Mathematics? You can explore the answer to this question by spending 8-10 weeks this summer at one of the many Research Experiences for Undergraduates (REUs) offered around the country. You can find a link to these REUs on the MSCS webpage, http://www.stolaf.edu/depts/mscs/Summeropps. Most of the application deadlines are in February but there are a few in January. If you would like to read about four students' experiences at an REU, check out the link on the MAA website, http://www.maa.org/students/reu_for_you.html. Please contact Becky Vandiver (vandiver@stolaf.edu) if you have any questions.

Math For America Teacher Fellowship

Would you like to improve Math education in US public secondary schools after college while earning a masters in secondary math education? Then please consider Math For America Teacher Fellowship. Here is a quick snapshot of the program:

- Five year fellowship program in NYC, LA, San Diego, Salt Lake City, DC, and Boston. The first year is spent full-time at a university (Columbia, NYU, or Bard College in NY) earning a masters in secondary math education and the next four years are spent teaching in that city.
- Full scholarship and living stipends for all five years
- Large network of support, career development meetings, helping with job placement, etc

More info can be found on the website (http://www.mathforamerica.org/home), and applications are due January 20th, 2012. If you have any questions, please feel free to contact Jake Leibold '07 (jakeleibold@gmail.com).

IAS/Park City Mathematics Institute

The IAS/Park City Mathematics Institute runs education and research programs that bring together the mathematics community in a unique way. The format of the research program will combine seminars and informal research discussions and collaborations with an energetic interaction with the Graduate Summer School. This research program will e held in Park City, Utah from July 1st to July 21st, and applications are due January 31st, 2012. If you have any questions, please visit their website (http://pcmi.ias.edu/summer-program/).

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If you would like to submit an article or math event to be published in the Math Mess, e-mail jacobsoj@stolaf.edu.