



Problem of the Month

Problem 0: September 2022

- (a) Consider the integers 392, 487, 638, and 791. For each of these integers, do the following.
- Determine whether the integer is a multiple of 7.
 - With the hundreds digit equal to A , the tens digit equal to B , and the units digit equal to C , compute $2A + 3B + C$.

What do you notice?

- (b) Suppose $n = ABC$ is a three-digit integer (A is the hundreds digit, B is the tens digit, and C is the units digit). Show that if ABC is a multiple of 7, then $2A + 3B + C$ is a multiple of 7.
- (c) Show that if $2A + 3B + C$ is a multiple of 7, then the three-digit integer $n = ABC$ is a multiple of 7.
- (d) Suppose $ABCDEF$ is a six-digit integer that has each of its digits different from 0. Show that $ABCDEF$ is a multiple of 7 if and only if $BCDEFA$ is a multiple of 7.
- (e) Think of ways to generalize the fact in part (d).
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