

Applied Algebra: Homework assignment 7

Due date: October 27

The first five problems of this homework are practice exercises for the midterm test. They are similar, in essence but not in form, to the actual midterm problems.

1. Explain how to measure 8 units of water using only two jugs, one of which holds precisely 12 units, the other holding 17 units of water.
 2. Find the smallest positive integer number x such that $5x + 1$ is divisible by 37.
 3. Find the remainder of 1,000,000,000,000 in division by 21.
 4. Find all integer numbers x such that $x - 5$ is divisible by 7 and $x - 4$ is divisible by 11.
 5. (a) Are there any numbers n such that $\varphi(n) = 14$? Explain!
(b) Find all n such that $\varphi(n) = 16$.
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6. Let $X = 1, 2, 3, 4, 5$. For each part, define a relation R on the set X so that R is
 - (1) reflexive and symmetric, but not transitive.
 - (2) symmetric and transitive, but not reflexive.
 - (3) reflexive, symmetric, transitive, and weakly antisymmetric.