

## Set Theory — 2. Other Homework problems

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Student: I've added these numbers ten times.

Teacher: Good girl.

Student: And here are my ten answers.

Finish the problems from the class handout.

### Competition practice

**Exercise 1. 2003 AMC 10B, Problem 2.** Al gets the disease algebritis and must take one green pill and one pink pill each day for two weeks. A green pill costs \$1 more than a pink pill, and Al's pills cost a total of \$546 for the two weeks. How much does one green pill cost?

**Exercise 2.** Calculate:

$$\frac{\left(\frac{1}{6} + 0.1 + \frac{1}{15}\right) / \left(\frac{1}{6} + 0.1 - \frac{1}{15}\right) \cdot 2.52}{\left(0.5 - \frac{1}{3} + 0.25 - \frac{1}{5}\right) / \left(0.25 - \frac{1}{6}\right) \cdot \frac{7}{13}}$$

**Exercise 3. 2005 AMC 10A, Problem 1.** Two is 10% of  $x$  and 20% of  $y$ . What is  $xy$ ?

**Exercise 4. 2005 AMC 10A, Problem 5.** A store normally sells windows at \$100 each. This week the store is offering one free window for each purchase of four. Dave needs seven windows and Doug needs eight windows. How much will they save if they purchase the windows together rather than separately?

**Exercise 5. 2005 AMC 10A, Problem 22.** Let  $S$  be the set of the 2005 smallest positive multiples of 4, and let  $T$  be the set of the 2005 smallest positive multiples of 6. How many elements are common to  $S$  and  $T$ ?

## Challenge Problems

**Exercise 6. 2005 AMC 12A, Problem 18.** Call a number “prime-looking” if it is composite but not divisible by 2,3, or 5. The three smallest prime-looking numbers are 49, 77, and 91. There are 168 prime numbers less than 1000. How many prime-looking numbers are there less than 1000?

**Exercise 7.** Three cannibals and three missionaries must cross a river. Their boat can only hold two people. If the cannibals outnumber the missionaries, on either side of the river, the missionaries are in trouble (I won't describe the results). Each missionary and each cannibal can row the boat. How can all six get across the river? A more difficult question: what if only one missionary and one cannibal know to row?