

Problem Solving Seminar - Problem Set 7

1. Given the statement "Each quantity equals its half." Find the falacy in the following "proof."

Let a and b be two different numbers. Let $a = b$. Multiply both sides of the equality by a, subtract b^2 from both sides. Now $a^2 - b^2 = ab - b^2$. Factor both sides of the equality. Divide both sides by a-b. Substitute b with a. The result is $2a = a$.

2. Prove that the sum of the first n members of the Fibonacci set 1,1,2,3,5,8,13, ... is 1 less than the (n+2)nd member of the same set.
3. Factor $x^3 + y^3 + z^3 - 3xyz$.
4. Prove: $\cos^2(3) + \cos^2(2) - \cos(4)\cos(2) = 1$.
5. Show on a coordinate system the graph of the set of points whose equation is $|x + y| + |x - y| = 4$.
6. Prove that the numbers $\sqrt{2}, \sqrt{3}$, and $\sqrt{5}$ cannot be the members of the same arithmetic progression.
7. What is the minimum value of the ration a/b so that you can make a Mobius strip from the rectangular strip with length b and width a?
8. Divide both parts of the figure with one line so the areas of all 4 parts are equal.

