

I U P U I  
MATH CLUB TEASER #6

November 7, 2008  
(due November 14, 2008)

SOLUTION

Represent the six persons by points and join every pair by a straight line:

Color in blue the edge between any two persons that know each other, and color in red the edge between two persons that do not know each other. The problem is equivalent to finding a triangle with three edges of the same color (a *monochromatic triangle*).

Now pick one person, say  $A$ . There are 5 edges coming out of  $A$ , so three or more have the same color  $\mathfrak{c}$ . Call  $B, C, D$  the people at the end of three of these edges.

If any edge between  $B, C, D$  has color  $\mathfrak{c}$ , it forms with  $A$  a triangle of color  $\mathfrak{c}$ . The alternative is that the three edges  $BC, CD$ , and  $DB$  have the opposite color to  $\mathfrak{c}$  and therefore form a monochromatic triangle.

SOLVED BY:

Captain Nemo, the Dream Team, the Residues.