IMO Mock 004

Time: 4:30 hours *Total Marks: 21*

Problem 1: Find (with proof) all odd integers $n > 1$ such that if $ab|n$ and are relatively primes, then $a+b-1|n$.

Problem 2: For $a, b, c > 0$ and $abc \geq 1$, prove that

$$\frac{a^2bc}{\sqrt{bc}+1} + \frac{b^2ca}{\sqrt{ca}+1} + \frac{c^2ab}{\sqrt{ab}+1} \geq \frac{3}{2}$$

Problem 3: O is the circumcenter of $\triangle ABC$ and T is that of $\triangle AOC$.M is the mid-point of side AC.On sides AB and BC, there are points D and E, respectively, such that $\angle BDM = \angle BEM = \angle ABC$.Prove that $BT \perp DE$.

All problems collected by Adib Hasan (http://www.facebook.com/phlembac.hidden)