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PROBLEM OF THE WEEK

11/27/01 **due NOON** 12/11/01

CAN YOU GIVE US A SOLUTION?

Problem No. 14 (Fall 2001 Series)

Consider the motion of a mass in the (x, y) plane. Given that the angular velocity $\omega = x\dot{y} - y\dot{x}$ ($\cdot$ is $\frac{d}{dt}$), and the Lenz vector (ℓ_x, ℓ_y), where $\ell_x = -\frac{\omega}{k}\dot{y} + \frac{x}{r}$, $\ell_y = \frac{\omega}{k}\dot{x} + \frac{y}{r}$ $(r = (x^2 + y^2)^{1/2})$ are constant (independent of t), show that the acceleration vector points toward the point where $r = 0$ and its magnitude is inversely proportional to r^2.

A panel in the Mathematics Department publishes a challenging problem once a week and invites college & pre-college students, faculty, and staff to submit solutions. The objective of this is to stimulate and cultivate interest in good mathematics, especially among younger students. Solutions are due within two weeks from the date of publication. They can be faxed to (765) 494-0548 or sent by campus or U.S. mail to:

PROBLEM OF THE WEEK, **8th Floor**, Math Sciences Bldg., Purdue Univ.,
West Lafayette, IN 47907

Solvers should include their name, address, and **status at the University or school**.

The names of those who submitted correct solutions will be posted in the Math. Library, along with the best solution. Every Purdue student who submits three or more correct solutions will receive a Certificate of Merit. A prize fund of $150.00 will be distributed among the Purdue undergraduates who have contributed at least six correct solutions for the total fall 2001 series.