The University of Alabama at Birmingham (UAB)
Department of Physics

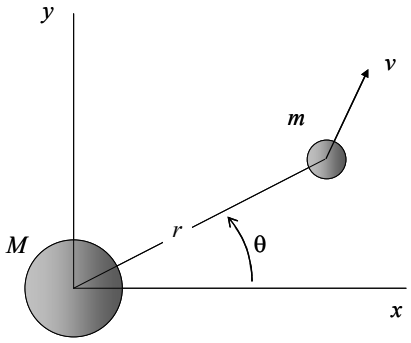
PH 462/562 – Classical Mechanics II – Spring 2006

Assignment # 6 Due: **Thursday, March 2**

1. Study **Section 7.1** in Textbook as follows:
   a. Read text.
   b. Reproduce all derivations in detail with pencil and paper.
   c. Work **Example 7.1** independently and compare your solution with Taylor's. Repeat until you are convinced you understand the example.
   d. Do the same as above for **Example 7.2**.
   e. Turn in your notes and worked examples for credit.

2. Work textbook problems: **7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8**

3. Mass m, shown in the figure below, is attracted to a stationary mass M by the gravitational force $F = -GmM/r^2$. At an initial distance r_0, m is given an initial velocity v_0 in the x-y plane. Set up the equations of motion in r, θ coordinates. Show that the angular momentum $p_\theta = mr^2\dot{\theta} =$ constant.



4. A particle of mass m moves on a plane under a force $-kr$ where r is the distance from the center of coordinates and k is a positive constant. Instead of the familiar polar r, θ coordinates, let us consider r and $\sin\theta$ as coordinates. Writing $x = r\cos\theta$ and $y = r\sin\theta$ and denoting $\sin\theta$ by q, we have $x = r\sqrt{1-q^2}$, $y = rq$. Find the Lagrangian of this particle in r, q coordinates and write the equations of motion.