Physics 342, Homework 3

1: 2-25 (medium) - Hint - The force being asked for in parts a and b is the normal force. Don't forget the acceleration is centripetal so $m\vec{a}$ needs to be put in the proper form. SKIP D

2: 2-26 (short) - straightforward

3: 2-41 (short) - straightforward

4: 2-43 (medium to short) - graph this potential. Remember total energy is $1/2mv^2 + U(x)$, I want what happens to a particle depending on it's location and the potential there.

5: 2-47 (short) easy if you remember ow to graph functions from calc 1.

6: 2-48 (short) trivial if you think a bit.

7: (medium) A small ball is placed on top of a large ball (think) ping pong on basketball. They are both dropped through a height h. The big ball hits the ground and begins to rebound just as the small ball hits it. Label the big ball mass M and the little ball mass m. Both initially have a velocity of $\sqrt{2gh}$ (from energy conservation. At the moment the big ball rebounds it's velocity is positive and the little balls is negative. Use momentum and energy conservation to derive the height to which the little ball rebounds. Assume $M >> m$ and the collision is elastic (energy conserving).

hint $1 + \frac{m}{M} = 1$, $M - m = M$, and $\frac{(M-m)^2}{M} = M - 2m$.