An Initial Value Problem

A pendulum consists of a 300 gram mass attached to the end of a string of length 75 cm.

- a) Using the small angle approximation($\sin\theta \approx \theta$), derive an equation for the angular acceleration of the pendulum, assuming that there is no friction.

- b)] The pendulum is given a push,and when it passes through the vertical it is traveling with an angular velocity of 1.3 rad/s in the counterclockwise direction. What is the angular velocity of the pendulum 0.5 second later? At what angle will the pendulum be located?

- c) Re-do part b) using the complex numbertechnique we saw in class.

- d) The next time the pendulum passes through the vertical, a 600 gram mass is placed directly in its path. Assuming that the ensuing collision between the pendulum and mass is perfetly elastic, what will the amplitude and period of the pendulum be after the collision?