Problems of the Week 6

Always show your work to receive credit (NO WORK=NO CREDIT)

1. A spring that does not conform to Hooke's Law has a force whose magnitude is given by $F=8x+4x^3$N with its direction opposite to the displacement of the spring. One end of the spring is attached to a support and a 2kg mass is suspended from the other end. The mass is raised so that the spring is un-stretched and released from rest. How fast (in m/s) is the mass traveling after it has fallen 1.00m?
   A. 8.34 B. 24.7 C. 1.11 D. 3.82 E. 2.05

2. A 1020kg automobile moves up an incline of 8^o powered by an engine that delivers constant power equal to 134hp. Assuming that there is resistance force equal to kv per unit weight, where v is the instantaneous speed of the automobile and k equals 0.05s/m , calculate the maximum possible speed up the incline. **Hint: what is the rate of change of W_{net} when the auto reaches terminal velocity?**
   A. 16.3mi/h B. 28.5mi/h C. 54.3mi/h D. 85.5mi/h