DAY 7 -- Homework

In all these problems, ignore air resistance.

1. Consider the following statement:
   In the real world only elliptical orbits and hyperbolic trajectories actually exist. Circular orbits and parabolic trajectories are just a mathematician's fantasy. Harrumph!
   Discuss whether this statement is true or false and why or why not.

2. Determine v_L and t_{TOT} for a height of 100 m using both the "near-the-Earth" and the "far-from-the-Earth" equations. Do the two give different results? They shouldn't.

3. Try the above problem calculating v_L for increasingly greater heights, and figure out at what height the "near" and "far" equations start to significantly disagree.

4. Imagine that a rock was dropped into the Sun by an astronaut hovering near the orbit of Mercury. How fast would the rock be moving when it hit the Sun? Repeat for Earth, Jupiter, and Pluto. Look up the needed solar system data.

5. In the above problem, how long (in days) would it take for the rock to reach the Sun in each case? Estimate your answers.

6. Explain why if v_L is escape velocity then both h and t_{TOT} are infinite. Use both math and discussion.