Basic Trig Questions

1) A passenger in a commercial jet that is flying 6 miles high looks down at a distant town from an angle of depression of 17 degrees. How far away is the town? (Hint- Find the distance along the ground)

2) A certain brand of ladder must be placed at an angle of 40 degrees in order to climb safely. How long of a ladder is needed to reach the top of a 28 foot house?

3) A zip line is tied to connect the tops of two trees. The smaller tree is 10ft tall. If 250 feet of line is used at an angle of elevation of 33 degrees, how tall is the second tree?

Basic Trig Related Rates Questions

4) An aircraft is flying horizontally at a constant height of 4000 feet above a fixed observation point. At a certain instant, the angle of elevation is 30 degrees and decreasing. If the aircraft is moving at a constant speed of 300mph, how fast is the angle of elevation decreasing at this instant?

5) A flight out of LaGuardia is climbing at an angle of elevation of 40 degrees. How fast is the aircraft gaining altitude if its speed is 250 mph?

6) A satellite is in an elliptical orbit around Earth. It's distance in miles is given by:

$$r \quad = \quad \frac{4995}{1 + 0.12\cos\Theta}$$

where r is distance.
   a) Find the altitude at the perigee and apogee of the satellite's orbit.
   b) At the instant when Θ is 120 degrees, Θ is increasing at a rate of 2.7 degrees/minute. Find both the altitude and the rate that the altitude is changing at this instant.