Math 026L.01 Spring 2000
Assignment #2

This assignment is due at the beginning of class on Wednesday, February 9, 2000. You must work through all problems on your own. You may consult any reference materials, and seek help in the Help Room, but do not discuss these problems with anyone else in the class. Show all work neatly and in order, and clearly indicate your final answers. Answers must be justified whenever possible in order to earn full credit.

1. (*3 points*) *(Coursepack Page 237 #8)*
A rocket is fired at sea level and climbs at a constant angle of 75° through a distance of 10 000 feet. Approximate its altitude to the nearest foot.

2. (*3 points*) *(Coursepack Page 237 #11)*
A motorist, travelling along a level highway at a speed of 60 km/h directly toward a distant mountain, observes that between 1:00 pm and 1:10 pm the angle of elevation to the top of the mountain changes from 10° to 70°. Approximate the height of the mountain.

3. (*3 points*) *(Coursepack Page 237 #12)*
An airplane pilot wishes to make his approach to an airstrip at an angle of 10° and travels at a rate of 250 ft/sec. Approximately how long does it take to reach an altitude of 15 000 feet?

4. (*6 points*) The displacement of a particle on a vibrating string is given by the equation

$$s(t) = 10 + \frac{1}{4}\sin(10\pi t)$$

where s is measured in centimeters and t in seconds.

(**a**) Find $v(t)$, the velocity of the particle after t seconds.

(**b**) Find $a(t)$, the acceleration of the particle after t seconds.

(**c**) Sketch $s(t)$, $v(t)$, and $a(t)$ on separate graphs.

5. (*5 points*) A 10 foot long ladder leans against a vertical wall. If the bottom of the ladder slides away from the base of the wall at a speed of 2 ft/sec, how fast is the angle between the ladder and the wall changing when the bottom of the ladder is 6 feet from the base of the wall?