Problem 1: A forest is 10 miles long. A wildfire starts at one end of the forest and moves in the opposite direction. Let \( x \) be the distance in miles from a point on the forest to the place where the fire started. The position of the head of the fire is propagating according to the function \( H(t) = 5 + \frac{1}{25}(t - 5)^3 \), where \( t \) is the time in hours since the fire started.

1. If the vegetation density in the forest is given by the function \( v(x) = 1000e^{-\frac{1}{10}(x-5)^2} \) tons per mile. How much vegetation is in the forest? Include the appropriate units.
2. Find the time it takes the wildfire to expand through all the forest?
3. Let \( A(t) \) be the amount in tons of vegetation burned after \( t \) hours the fire started. Find a formula for \( A(t) \).
4. How much vegetation is left in the forest after 2 hours the fire started?

Problem 2: Project 2 Chapter 8 (page 461) only part a).

Problem 3: Review exercises chapter 8 # 74 (page 458).

Problem 4: A solid half-cylinder of radius 1 meters and length of 5 meters lies under 50 meters of water at the bottom of a lake. The cylinder is made of a material of constant density \( \delta \).

1. Find its center of mass.
2. What is the pressure exerted by the water on one of the lateral circular faces of the half cylinder?
3. What is the water pressure on the top rectangular face?