

NAME: _____

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Worksheet week 2 - MAC 2312, Spring 2013

1. (modified version of Pb. 44 p. 384 textbook) A student wants to determine the height of a building. She goes to the top and lets a stone drop.

- (a) Assuming that it takes 5 seconds for the stone to reach the ground, what is the height of the building?
- (b) This time assume that it takes 5 seconds until the sound of the stone hitting the ground reaches the student. How tall is the building in this case?
(Take 1080 ft/s as the speed of the sound and $g = 32 \text{ ft/s}^2$ the gravitational acceleration.)

2. (modified version of Pb. 25 p. 389 textbook) Water is run at a constant rate of $1 \text{ ft}^3/\text{min}$ to fill in a conical tank with a base radius of 3 ft and height of 5 ft. Suppose the tank sits with its base at ground level and its tip underground (see picture). Suppose also that the tank is initially empty.

- (a) How long does it take to fill in the tank? $V_{\text{cone}} = \frac{1}{3}\pi r^2 h$
- (b) Determine the height $h(t)$ of the water in the tank after t minutes.
- (c) Find the average height h_{ave} of the water in the tank over the time interval it takes to fill in the tank.
- (d) Find the value of t^* so that $h(t^*) = h_{\text{ave}}$.