MATH 31

## Applications of Derivatives - HW \#2

Name
Date $\qquad$

1. Sand pouring from a conveyor belt forms a conical pile, the radius of which is $\frac{3}{4}$ of the height. The sand is piling up at a constant rate of $0.5 \mathrm{~m}^{3} / \mathrm{min}$. At what rate is the height of the pile growing 3 minutes after the pouring starts?
2. When a small pebble is dropped in a pool of still water, it produces a circular wave that travels outward at a constant speed of $15 \mathrm{~cm} / \mathrm{s}$. At what rate is the area inside the wave increasing when
a) the area is $400 \pi \mathrm{~cm}^{2}$ ?
b) 4 s have elapsed?
3. A lady, 5 feet tall, is walking away from a lamppost that is 25 feet high. The lady is 15 feet from the lamppost and walking at a rate of 2.5 feet/second. At what rate is her shadow increasing? [Round your answer to the nearest tenth.]
4. Gas is escaping from a spherical weather balloon at a rate of $500 \mathrm{~cm}^{3} / \mathrm{min}$. How fast is the surface area, $S$, shrinking when the radius is 15 meters? $V=\frac{4}{3} \pi r^{3}$ and $S A=4 \pi r^{2}$
