

### MATH 215 WORKSHEET #9.5

- (1) A spherical balloon is being filled with helium at a rate of  $2 \text{ cm}^3/\text{sec}$ . How fast is the radius increasing when the radius is 5 cm? When it is 10 cm?
- (2) A boat is pulled into a dock by a rope attached to the bow of the boat and to a winch that is 1 m higher than the bow of the boat. If the rope is pulled in at a rate of 1 m/s, how fast is the boat moving when it is 8 m from the dock?
- (3) A 10 foot ladder is leaning on a wall and is sliding down. The top of the ladder is sliding toward the ground at a rate of 1 ft/sec. How fast is the bottom of the ladder moving away from the wall when the top is 6 feet from the ground?
- (4) An elephant steps on a can of beans, which is (initially, at least) 5 inches tall and has a radius of 2 inches. When the elephant steps on it, the volume does not change, but the height starts decreasing at 2 inches per second. How fast is the radius increasing?
- (5) The legendary Bigfoot decides he is getting old and goes wondering off looking for that special someone. Bigfoot is 7 feet tall and really likes tall blonde women. However, what he thinks to be the woman of his dreams is really a 15 foot tall light post. Bigfoot runs toward the post at a rate of 5 ft/sec. How fast is the length of his shadow shrinking when he is 10 feet away from the post?
- (6) The skull length and backbone length of Ichthyosaurs both increase as the individual grows (or at least they would except for the fact that Ichthyosaurs have been extinct for 65 million years). The skull length and backbone length are related by the allometric equation

$$S = 1.162B^{0.933}$$

Find the equation relating  $\frac{dS/dt}{S}$  and  $\frac{dB/dt}{B}$ .