

1. Compute the derivatives of the following functions.

(a)  $f(x) = \ln(\ln(\sqrt{x}))$ .

(b)  $g(x) = x^{x^2+e^x}$ .

(c)  $h(x) = \sqrt{\sqrt{x}\sqrt{x}}$  (*Do this problem last.*)

2. (HW17 - #1) A street light is mounted at the top of a 15-ft-tall pole. A man 6 ft tall walks away from the pole with a speed of 7 ft/s along a straight path. How fast is the tip of his shadow moving when he is 30 ft from the pole?
3. (HW16 - #11) Two sides of a triangle are 6 m and 12 m in length and the angle between them is increasing at a rate of 0.06 rad/s. Find the rate at which the area of the triangle is increasing when the angle between the sides of fixed length is  $\frac{\pi}{3}$  radians.
4. The class flag is being raised up a pole with height function  $H(t) = 5t^2 + 2$  (in meters). Matt is 2 meters tall, and is walking away from the flagpole at a constant velocity of 5 m/s. When  $t = 1$  he is 4 meters from the flagpole. At this time, what is the rate at which the distance between the top of Matt's head and the flag changing?