Worksheet 07

Instructor: Hong Chen **Topics:** Sections 3.9 and 3.10

Due: Sunday, November 15, 2026, at 11:59 p.m. **Submit:** Gradescope

Logarithmic differentiation

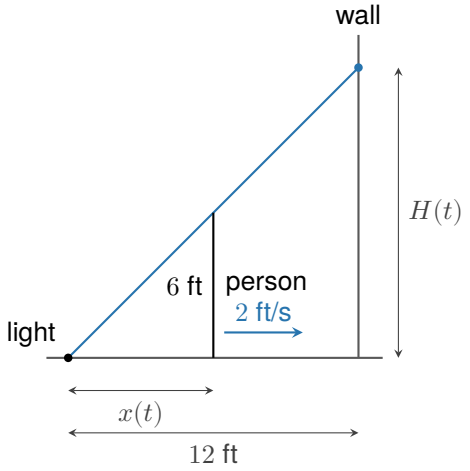
1. Use logarithmic differentiation to find the derivative of each function for $x > 0$.

(a) $f(x) = \dfrac{(x^2+1)^2}{\sqrt{x+2}}$

(b) $g(x) = (x+1)^{2x}$.

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2. A light on the ground is 12 ft from a tall vertical wall. A 6-ft-tall person walks directly away from the light and toward the wall at 2 ft/s. How fast is the top of the person's shadow moving on the wall when the person is 6 ft from the light?



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3. A circular stain spreads on a flat surface. When its radius is 5 cm, its area is increasing at 20π cm^2/s. At that instant, how fast are the radius and the circumference increasing?

4. A light sensor at the bottom of a tank reads $I = 80e^{-h/2}$ lux when the water is h meters deep. The water depth is increasing at $1/2$ m/min. Find the following at the instant the sensor reads 20 lux.

(a) Find the water depth and give an exact answer.

(b) At what rate is the sensor reading changing?