1. Compute the derivative:

\[ y = \text{Arcsec}(2s + 1) \]

Solution.

\[ y' = \frac{2}{|2s + 1| \sqrt{(2s + 1)^2 - 1}}. \]

2. Water runs into a conical tank at the rate of 9 ft.\(^3\)/min. The tank stands vertex down and has a height of 10 feet and a base radius of 5 feet. How fast is the water level rising when the water is 6 feet deep?

Solution.

- Let \( V \) denote the volume of water in the tank.
- Let \( r \) denote the radius of the water.
- Let \( h \) denote the height of the water.
- Given \( \frac{dV}{dt} = 9 \) ft.\(^3\)/min.
- Find \( \frac{dh}{dt} \) when \( h = 6 \).

As the figure indicates,

\[ \frac{r}{h} = \frac{5}{10}. \]

Thus

\[ r = \frac{h}{2}. \]

The volume of a cone is

\[ V = \frac{\pi}{3} r^2 h. \]

We have

\[ V = \frac{\pi}{3} \left(\frac{h}{2}\right)^2 h = \frac{\pi}{3} \cdot 4 \cdot h^3. \]

Thus

\[ \frac{dV}{dt} = \frac{\pi}{3} h^2 \frac{dh}{dt}. \]

Solve for \( \frac{dh}{dt} \):

\[ \frac{dh}{dt} = \frac{4 \frac{dV}{dt}}{\pi h^2}. \]

So

\[ \frac{dh}{dt} \bigg|_{h=6} = \frac{4 \cdot 9}{\pi 6^2} = \frac{1}{\pi}. \]