

Name: _____

NON-GRAPHING CALCULATORS ALLOWED

1. [10 points] Find the derivatives of the two functions below.

a. $\cos^{-1}(3^x)$

b. $\ln(\csc^2(3x))$

2. [10 points] A water tank has the shape of an inverted circular cone with the radius of the top equal to 2 meters and a depth of 4 meters. If water is being pumped in at a rate of $2 \text{ m}^3/\text{min}$, what is the rate of change of the water level when the water is 3 meters deep? Given your answer is m/min rounded to the nearest 3rd decimal place.

3. [10 points] Find the following limits.

a. $\lim_{x \rightarrow 0^+} \tan^{-1}\left(\frac{1}{x}\right)$

b. $\lim_{x \rightarrow 7^-} \ln|x - 7|$