

Math 113 Calculus – Homework 2

1	2	TOTAL
75	25	100

Please do not write anything inside the above boxes!

Check that there are 2 questions on your booklet. Write your name on top of every page. Show your work in reasonable detail. A correct answer without proper or too much reasoning may not get any credit. No hanging expressions will be read. No interpretation of your work will be attempted. Write everything you want us to know. Do not leave anything to mind reading; we do not do that in Math department, yet!

Q-1) We have a water tank in the form of an inverted cone containing some water. Another inverted cone of the same dimensions as the first one is touching the water level at the center of the water surface. Both cones are vertical. The second cone is moving down at a constant speed. How fast is the water level rising?

Hint: *To unify notation, for both of the cones let the ratio of base radius to height be $\alpha > 0$. Say the water level at time 0, when the second cone is just touching the water surface, is $d_0 > 0$. Say that the second cone is moving down with the constant speed of $s_0 > 0$ units per second. Let $h(t)$ denote the height of water at time t . Find $h'(t)$.*

NAME:

STUDENT NO:

Q-2) For each positive integer n , calculate the limit $\lim_{x \rightarrow 0} \frac{\cos^n x \sin^n x}{\cos x^n \sin x^n}$.