

Mathematics 1110H – Calculus I: Limits, derivatives, and Integrals

TRENT UNIVERSITY, Summer 2018

Assignment #4

Optimal Cone: The Sequel

Due on Wednesday, 6 June.

Recall the sole question from Assignment #3:

1. A right circular cone with radius r and height h has volume $V = \frac{1}{3}\pi r^2 h$ and surface area (counting the area of the circle at the non-pointy end) of $A = \pi r^2 + \pi r\sqrt{r^2 + h^2}$. Suppose that such a cone is to have a total volume of $100 L$. What is the minimum possible surface area of such a cone? [10]

It's a pretty good bet that if you tried to do this, things got just a bit messy. This time you get to have `Maple` do much of the work. `Maple` has several operations and commands that might be helpful. In particular, the `diff` operator takes the derivative of an expression and the `solve` command and its relatives, especially `fsolve`, are often useful if you need to solve an equation. Please read up on the basics of these and other possibly useful commands in Prof. Urroz's introductions to using Maple [1] and [2].

1. (*The sequel.*) Answer question 1 from Assignment #3, using `Maple` as much as possible to perform the actual symbolic manipulations and computations. Please include the printout(s) of your `Maple` work with your solution. [10]

NOTE. You may use other software, such as `Mathematica` or `SageMath`, with similar capabilities instead of `Maple` if you wish.

REFERENCES

1. *Getting started with Maple 10*, by Gilberto E. Urroz (2005), which can found (pdf) at: www.trentu.ca/mathematics/sb/1110H/Summer-2018/GettingStartedMaple10.pdf
2. *A survey of mathematical applications using Maple 10*, by Gilberto E. Urroz (2005), which can found pdf & `Maple` worksheet) at:
www.trentu.ca/mathematics/sb/1110H/Summer-2018/MathematicsSurveyMaple10.pdf
OR www.trentu.ca/mathematics/sb/1110H/Summer-2018/MathSurveyMaple10.mw