

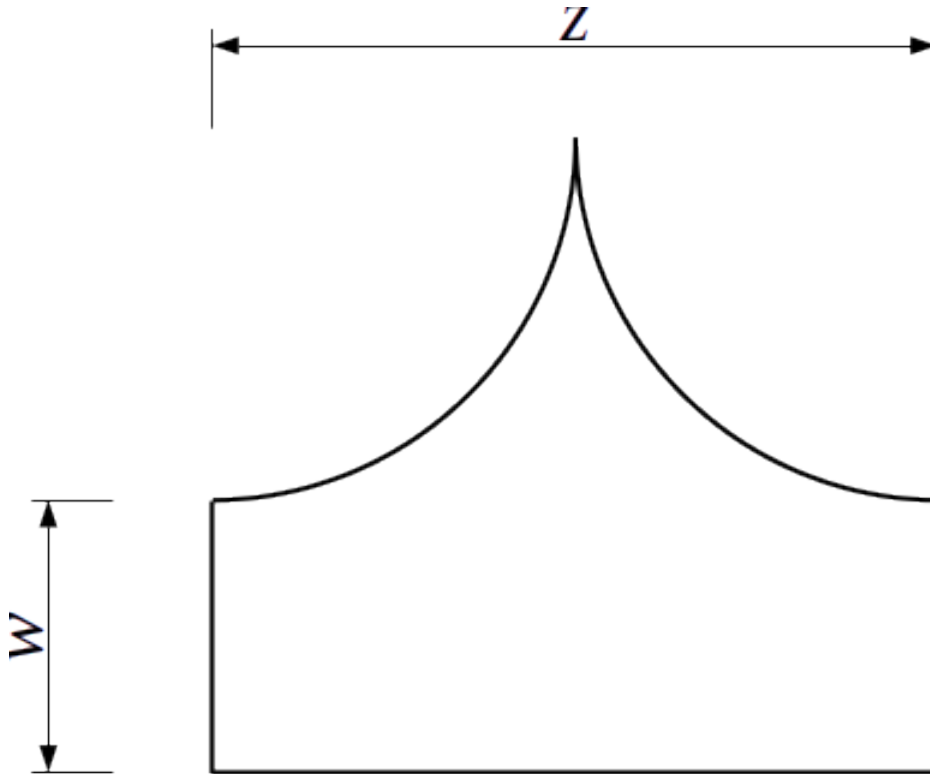
Mathematics 1110H – Calculus I: Limits, Derivatives, and Integrals

TRENT UNIVERSITY, Summer 2023 (S61)

Assignment #4

Pointy Window

Due* just before midnight on Friday, 2 June.



Architect Thom demands that a certain window be shaped as in the diagram above. (Start with a rectangle with base z and height $w + \frac{z}{2}$, and cut out the two quarter-circles of radius $\frac{z}{2}$ centered at the two upper corners of the rectangle.) The specific dimensions don't matter to Thom, just that the area be as large as possible, and the budget for glass for the project limits this window to an area of at most 4 m^2 . On the other hand, the contractor wishes to minimize the perimeter of the window to keep the cost of the frame around it as low as possible.

1. What is the minimum possible perimeter of such a window, given that its area must be 4 m^2 ? [10]

You may do this entirely by hand or use SageMath or similar software to help you out. In any case, show all your work!

* You should submit your solutions via Blackboard's Assignments module, preferably as a single pdf. If this fails, you may submit your work to the instructor on paper or by email to sbilaniuk@trentu.ca.