

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

TRENT UNIVERSITY, Fall 2025

Workshop Problems for 2025-11-07

These are the sort of problems we've been doing lately. Not unlikely to turn up on Test #4 ...

- A rectangle has its base on the x -axis and its top side runs from the line $y = x + 3$ on the left to the line $y = 3 - 3x$ on the right. Find the maximum area of such a rectangle.
- What is the maximum area of a triangle whose vertices are the points $(0,0)$, $(x,0)$, and $\left(x, \frac{1}{1+x^2}\right)$ for some $x \geq 0$?
- A zombie is dropped into a still pool, creating a circular ripple that moves outward from the point of impact at a constant speed. After 2 s the length of the ripple is increasing at a rate of 2π m/s . How is the area enclosed by the ripple changing at this instant?
- A spherical balloon is being inflated at a rate of 1 m^3/s . How is its surface area changing at the instant that its volume is 36 m^3 ? [Recall that a sphere of radius r has volume $\frac{4}{3}\pi r^3$ and surface area $4\pi r^2$.]
- A point P is moving along the line whose equation is $y = 2x$. How fast is the distance between P and the point $(3,0)$ changing at the instant when P is at $(3,6)$ if x is decreasing at the rate of 2 m/s at that instant?