Michigan Math Club

Thursday at 4pm in the Commons

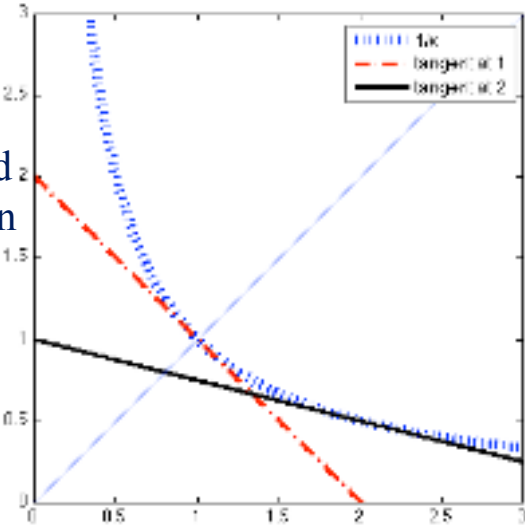
Free Pizza and Pop

Calculus—no limits!

Martin Strauss

Abstract for 8 January 2015

A large part of calculus is finding slopes of lines tangent to curves and areas under curves. Calculus traditionally focuses on manipulating algebraic expressions and taking limits and leaves odd/even and other symmetries as a curiosity, but a lot can be gotten from symmetry and similar considerations alone, using a little algebraic manipulation but no limits.



For $y=1/x$, reflection about $y=x$ and stretching (e.g., x by 2 and y by ½) gets all tangent lines. Find tangent lines for polynomials, sines, cosines, exponentials, and logs. Fair game: convexity of these curves, symmetries of reflection, rotation, scaling, $\mathbf{R}^2 \geq 0$, and linearity of the derivative. Show $(fg)'=f'g+fg'$. Find integrals for polynomials and exponentials. More?