

## Practice Exam 2

1. An architect want to design a window in the shape of a rectangle capped by a semicircle. If the perimeter of the window is constrained to be 24 feet, what dimensions should the architect choose for the window in order to admit the greatest amount of light?
2. The Indiana Toll Road is about 150 miles long and the speed limit is 65 miles per hour. A driver's entry ticket is stamped at 12 noon. When he exits at the other end at 2 PM, he receives a speeding ticket. Why is the cop justified in ticketing him even if he never saw him speeding? Use ideas from calculus.
3. Evaluate  $\lim_{x \rightarrow 0} (e^x + 3x)^{1/x}$ .
4. Graph  $y = (\sin x)^3$  on the interval  $[0, 2\pi]$ .
5. Find the area between the line  $y = 2$  and the branch of the curve  $y = (\sec x)^2$  lying between the asymptotes at  $x = \pm\pi/2$ .