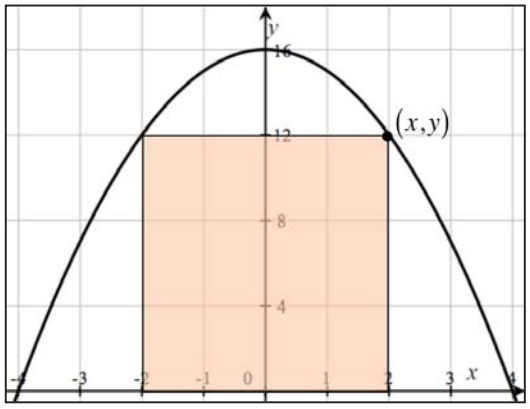
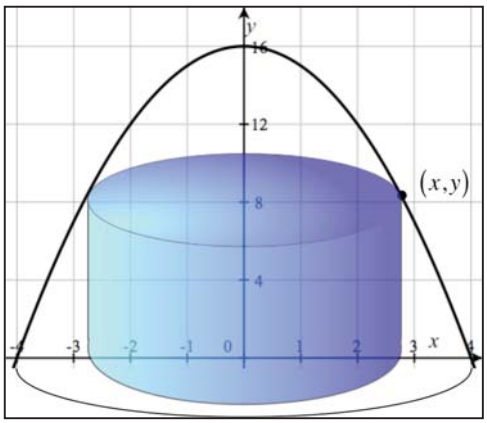
A rectangle is inscribed in the region bounded by the *x*-axis and the parabola $y = 16 - x^2$ as shown in the figure to the right.



a. The point shown in the figure moves along the curve so that its *x*-coordinate increases at the constant rate of 1.5 units/minute. Find the rate of change of the area of the rectangle when $x = 2$.

b. Find the dimensions of the rectangle that gives the greatest area.

c. The parabola $y = 16 - x^2$ is rotated about the *y*-axis to form a paraboloid. A cylinder is inscribed in the paraboloid as shown in the figure to the right. Find the radius and height of the cylinder of greatest volume.



36. AB Calculus – Step-by-Step (Calculators Allowed) **Name** _____

The price of a share of stock in dollars over a week is given by the function $P(t) = \sqrt{2t+1} + 2\cos t + 20$ where t is measured in days and $0 \le t \le 5$.

a. Find the average rate of change of the price of the stock over [0, 5]. Use correct units.

b. Apply the Mean-Value Theorem to P on [0, 5] and explain the result in the context of the problem situation.

c. On what value of t over the 5-day period is the price of the stock increasing the fastest?