MATH 2250 Calculus I
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Name:
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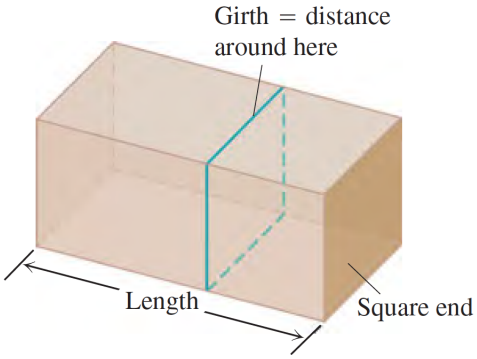
Practice Quiz No. 8

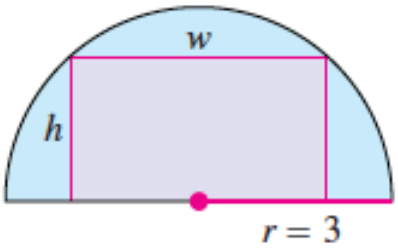
Show all of your work, label your answers clearly, and do not use a calculator.

Problem 1 The U.S. Postal Service will accept a box for domestic shipment only if the sum of its length and girth (distance around) does not exceed 108 in. What dimensions will give a box with a square end the largest possible volume?



Problem 2 A grain silo is being designed as follows: a semispherical dome is to be placed on top of a right circular cylinder (without top and without bottom). If the silo needs to be designed so that the volume is $\frac{16\pi}{3}$ ft^3, what are the radius and the height of the silo that minimize the surface area of the silo?

Problem 3 Determine the dimensions of the rectangle of largest area that can be inscribed in a semicircle of radius 3.



Problem 4 A window is in the form of a rectangle surmounted by a semicircle. The rectangle is of clear glass, whereas the semicircle is of tinted glass that transmits only half as much light per unit area as clear glass does. The total perimeter is fixed. Find the proportions of the window that will admit the most light. Neglect the thickness of the frame.