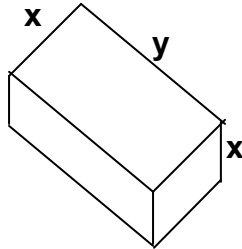


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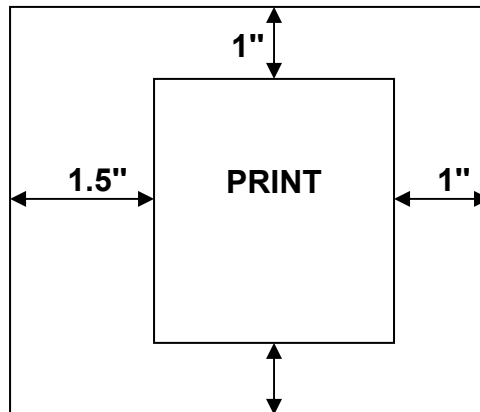
Calculus Practice Quiz #5

This quiz is to determine if you have mastered the material by attending tutoring sessions and completing your homework. Please write legibly and show as much work as possible for each problem.

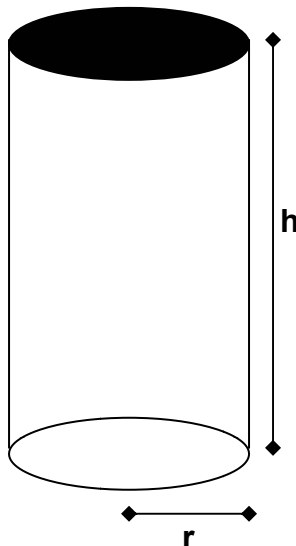
1. A shipping box with a square end is acceptable to the postal service if its height added to the perimeter of the base is no greater than 108 in. Find the maximum volume that can be shipped this way and give the dimensions of the package.



2. A printed matter on a page is to occupy an area of 80 square inches with margins of one inch at the top, bottom, and right side and 1.5 inches on the left side. Find the dimensions of the page that give the minimum total area and find the minimum area.



3. A cylinder of radius r and height h has volume $V = \pi r^2 h$ and lateral area $L = 2\pi r h$. If an open container has volume $64\pi \text{ in}^3$, find the radius and the height that minimize the surface area of the container (lateral area plus one end).



4. Use differentials to approximate the value of $\cos(61^\circ)$.

5. In a right triangle, the angle opposite a 10 m side is measured to be 30° . The true angle is later discovered to be 30.3° . Estimate the correction that should be made in the calculated length for the hypotenuse. Show organized work and correct notation.

6. Evaluate each of the following integrals.

a. $\int \frac{x^2(x^{3/2} - 5x)}{x^{3/2}} dx$

b. $\int \frac{\sin^3 x - 3}{1 - \cos^2 x} dx$

7. Solve the differential equation

$$\frac{dy}{dx} = \tan^2 x$$

with boundary condition that $y = 1$ when $x = \pi/4$. Then find y when $x = 0$.