

NAME _____

1. Find(if possible) the maximum and minimum values of

$$f(x) = \frac{64}{\sin x} + \frac{27}{\cos x}$$

on $(0, \pi/2)$.

2. Find the dimensions of the right circular cylinder of greatest volume that can be inscribed in a given right circular cone.
3. Find the points on the parabola $x = 2y^2$ that are closest to the point $(10, 0)$. Hint: minimize the square of the distance between (x, y) and $(10, 0)$.
4. A fence h feet high runs parallel to a tall building and w feet away from it. Find the length of the shortest ladder that will reach from the ground across the top of the fence to the wall of the building.
5. A flower bed will be in the shape of a sector of a circle (a pie-shaped region) of radius r and vertex angle ϕ . Find r and ϕ if its area is a constant A and the perimeter is a minimum.
6. At 7:00 a.m. one ship was 60 kilometers due east of a second ship. If the first ship sailed west at 20 kilometers per hour and the second ship sailed southeast at 30 kilometers per hour, when were they closest together?
7. What is the length of the largest ladder that can be carried horizontally around the corner of two hallways of widths a and b ? Hint: this is already answered in question 4.