

Calculus Worksheet #5 Unit 8

Solve each of the following problems. Show your work and your solutions neatly organized on separate work paper.

1. Find the least and the greatest straight line distance between the ellipse $4x^2 + 9y^2 = 36$ and the point $(1, 0)$.
2. A messenger is to go ashore from a ship that is 10 miles offshore and deliver a message to a camp that is 20 miles up the beach from the point nearest the ship. She can go 12 mph by boat and will be met by a jeep that can go 30 mph over the beach. Where should she land to complete the trip in as short a time as possible?
3. A silo is to be built in the shape of a cylinder topped by a hemisphere and is to hold a given volume. If the material for the top costs twice as much as the material for the bottom, then what proportions will minimize the total cost of the material?
4. A strip of metal 24 inches wide is to be made into a gutter by bending up an 8 inch strip along each side. What should the angle between the sides and the bottom be in order to maximize the volume the gutter can hold?
5. A piece of wire k inches long is to be made into a circle, a square, or both. Find the length of each side of the square if the total area enclosed is (a) a maximum, or (b) a minimum.