

Math 251/249

Worksheet 11

1. Determine the dimensions of the largest rectangle which can be inscribed in a right triangle so that one side of the rectangle lies on the hypotenuse of the right triangle. The legs of the right triangle are 3 cm. and 4cm. in length.
2. Determine the dimensions of the largest right circular cone which can be inscribed in a sphere of radius 9 cm.
3. A wire of length 100 cm. must be cut into two pieces. One piece of the wire is bent into the shape of an equilateral triangle and the other is bent into the shape of a square. Determine where the cut must be made so that the area enclosed is (a) a maximum, (b) a minimum.
4. A boat leaves a dock at 2:00pm and travels due south at a speed of 20 km./hour. Another boat has been heading due east at 15 km./hour and reaches the same dock at 3:00pm. At what time were the two boats closest together?
5. A woman at a point A on the shore of a circular lake with radius 4 km. wants to arrive at a point C which is diametrically opposite to A on the other side of the lake in the shortest possible time. She can walk at the rate of 5 km./ hour and can row a boat at 2.5 km./hour. How should she proceed?
6. A steel pipe is being carried down a hallway which is 9 ft. wide. At the end of the hall there is a right-angled turn into a narrower hallway which is 6 ft. wide. What is the length of the longest pipe that can be carried horizontally around the corner?
7. A fence 8 ft. tall runs parallel to a tall building at a distance of 4 ft. from the building. What is the length of the shortest ladder that will reach from the ground over the fence to the wall of the building?
8. Find the equation of the straight line which passes through the point (3,5) and cuts the least area from the first quadrant.
9. A rain gutter is to be constructed from a metal sheet of width 30 cm. by bending up one-third of the sheet on each side through an angle θ . How should θ be chosen so that the gutter will carry the maximum amount of water?