

1.

[5 points]

An **open** tank in the shape of a square-based cuboid is to be constructed. The volume of the tank must be 20 l. The cost of the base is 5 PLN per dm^2 and the cost of the side faces is 1 PLN per dm^2 . Find the dimensions of the tank that minimize the cost.

2.

[5 points]

A cylinder is inscribed in a cone so that their centerlines coincide. The cone has height of 6 and radius of the base of 3. Find the dimensions of the cylinder that has maximum volume.

3.

[5 points]

A balloon is rising vertically from a point on the ground that is 200 metres from an observer at ground level. The angle of elevation from the observer to the balloon is increasing at a rate of 9° per second at the instant this angle is 45° . How fast is the balloon rising at this time?

4.

[5 points]

Water is evaporating from a cup in a shape of an inverted cone. The rate of evaporation is proportional to the area of the surface of the water. Show that the depth of the water decreases at a constant rate that does not depend on the dimensions of the cup.