1. Find the point on the line $y = 2x + 3$ which is closest to the origin.

2. The top and bottom margins of a poster are each 6 cm and the side margins are 4 cm. If the area of the printed material on the poster is fixed at 384 cm^2, find the dimensions of the poster with the smallest total area.

3. A right circular cylinder is inscribed in a sphere of radius r. Find the largest possible volume of such a cylinder.