Optimization exercises

1. A printer needs to make a poster that will have a total area of 19,440 cm^2 with blank margins of 6 cm on the left and right, and 10 cm on the top and bottom. To the nearest cm, what dimensions will give the largest printed area?

2. A boat leaves a port at 4:00 PM and travels due north at a speed of 40 km/h. Another boat has been heading due west at 20 km/h and reaches the same port at 5:00 PM. At what time were the two boats closest together to the nearest minute?

3. We want to construct an open-topped box in the shape of a rectangular prism whose base is 60% longer than it is wide. The material used to build the sides costs 0.6 cents per cm^2 and the material used to build the base costs 1 cent per cm^2. If the box must have a volume of $2000\,\text{cm}^3$, determine the dimensions of the box (to the nearest tenth of a centimetre) that will minimize the cost of the box.