1. The ‘Spotted Cow’ milk company wants to design a new milk cartoon with a square base and volume $250\text{cm}^3$. What dimensions will produce a carton with minimum surface area? Why might a company want to do this?

2. A rectangle is bounded by the $x-$ and $y-$axis and the line $y = -4x + 10$. What length and width should the rectangle be to achieve maximum area?

3. What is the maximum volume of a right circular cone that can be inscribed into a sphere of radius $r$?

4. If you want to develop a new 1L cylindrical soup can, what dimensions need the minimum amount of material?

5. Neptune is in a boat $3\text{km}$ from the nearest point of a straight shoreline. He needs to go his cabin which is $4\text{km}$ down the coast and $1\text{km}$ inland. If he rows at $3\text{km}/\text{hour}$ and walks at $5\text{km}/\text{hour}$, toward what point on the coast should Neptune row in order to get home in the minimum amount of time?