Remarks on Tutorial 5

Q1

The manufacturer of Milo can (volume $V = \pi r^2 h$ is fixed) wants to minimize the cost C(r) of aluminium used and welding

Assume that J is the cost (fixed) of aluminium per square cm
K is the cost (fixed) of welding per cm
(only the top of the can is welded on)

When the cost is minimum, there are relations among the height h , radius r, J and k. The height h and radius r of the optimum can are 12.5 cm and 2.5 cm resp. which are obtained by measuring a can of Milo. We want to compute the ratio K/J in this question if h=12.5, r=2.5

The answer of K/J is about 7.5, make comments on this answer.

Q3,Q4,Q5

After obtaining the solution, we want to analyse it.

"Analyse" means discussing under what conditions the population increases, decreases, remains unchanged. The conditions depend on the values of initial populations. See Chapter three , models of population

Q4

In this model, the human birth and death rates per capita (B and D) are constant

After Women under 50 left the island , B=?

Q3

This model is similar to model of harvesting, here emigration=catching fish=E, except that D here is constant. In 1st part E=constant, in 2nd part, E is proportional to time. ODEs in this question are 1st order Linear non homogeneous equations

Q5 Instead of $\frac{dN}{dt} = (B - sN)N$ Logistic model

We have $\frac{dN}{dt} = (sN - D)N$ where D is a constant

Solve this ODE and analyse its solutions with given initial populations.