Optimization Assignment - 1

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Problem Statement

A tank with rectangular base and rectangular sides, open at the top is to be constructed so that its depth is 2 m and volume is $8m^3$. If building of tank costs Rs 70 per sq metres for the base and Rs 45 per square metre for sides. What is the cost of least expensive tank?

Given

Let l,b and h be the length, width and height of a tank
The volume of tank is given by,

$$8 = lbh \tag{1}$$

$$h = 2 \tag{2}$$

Cost of Building

$$R_b = 70/m^2 \tag{3}$$

$$R_s = 45/m^2 \tag{4}$$

To Find

Total least cost of tank

Solution

Using cvxpy
The given problem can then be formulated as,

$$S = \min_{l,b} R_b(lb) + R_s(4(l+b)) \tag{5}$$

$$\text{s.t} \quad lb = 4 \tag{6}$$

which is a disciplined geometric programming (DGP) problem that can be solved using cvxpy. DGP is a subset of log-log-convex program (LLCP).