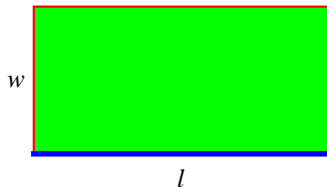


Constrained optimization

Problem: Design a fence to enclose a rectangular region of area 1200 m^2 . Material for one edge (facing the street) costs \$50 per meter while material for the other three edges costs \$30 per meter.

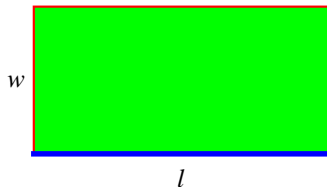
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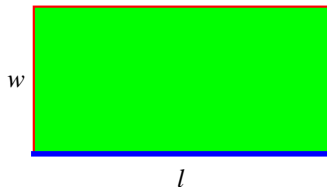
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Objective: Minimize $C = 50l + 30w + 2 \cdot 30w = 80l + 60w$.

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Constraint: Need $lw = 1200$.

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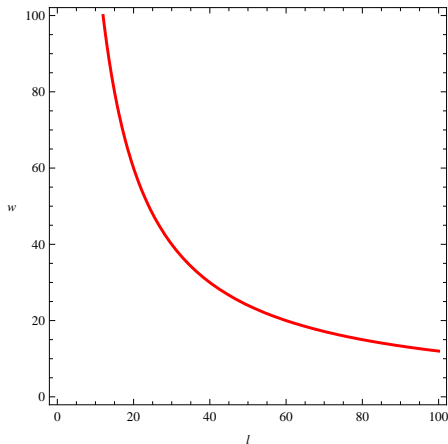
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So build fence with expensive edge of length 30 meters and other dimension of 40 meters.

Idea for Method 2



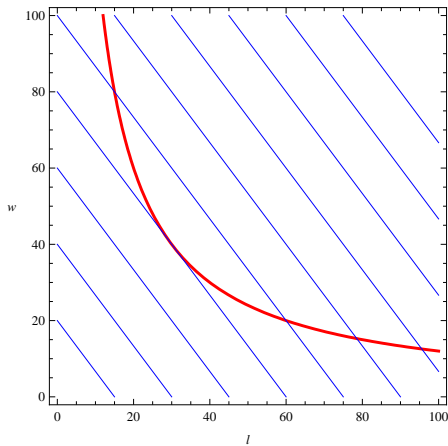
Constraint curve $A = lw = 1200$

Level curves for objective $C = 80l + 60w$

Gradient vectors for constraint $A = lw$

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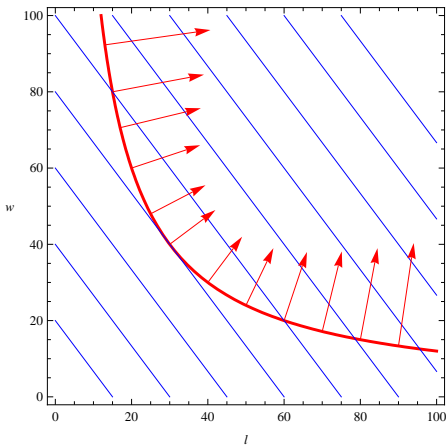
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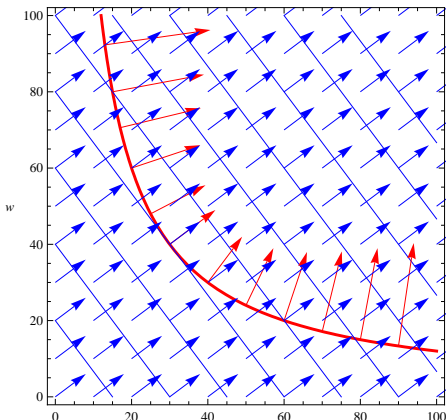
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$$\vec{\nabla} C = \lambda \vec{\nabla} A \text{ for some constant } \lambda$$