Optimization Class Examples

[A] An open top box is to be made by cutting equal sized squares
from the corners of a 30 cm by 30 cm piece of cardboard, then folding the sides up.
What are the dimensions of the box of largest volume which can be made ?

[B] What is the point on the graph $y = x^2$ which is closest to the point (–4, 3.5) ?

[C] A camper is standing on the opposite side of a ½ mile wide river from his camp 6 miles down the river.
If he can swim at 4 mph and walk at 5mph, find the route which will get him to camp fastest.

[1] Draw a diagram, if possible.

[2] Name the **quantity** you want the largest/maximum or smallest/minimum value of.

[3] Name the **quantity/quantities** you can change to try to get the maximum or minimum value of [2].

[4] Find the formula for the quantity in [2] in terms of the quantity/quantities in [3].

IF THE FORMULA IN [4] INVOLVES MORE THAN ONE VARIABLE FROM [3]:

[4a] Find any restrictions/relationships between the quantities in [3] not involving any other quantities.

[4b] Solve [4a] in terms of one quantity.

[4c] Rewrite [4] in terms of one quantity using [4b].

[5] Find the smallest and largest allowable values of the independent quantity in [4].

[6] Use calculus to find the global maximum/minimum of the dependent quantity in [4] on the domain in [5].