Αλγοριθμική Επιχειρησιακή Έρευνα
Δεύτερη Εργασία

Σιώρος Βασίλειος
Ανδρινοπούλου Χριστίνα

Οκτώβριος 2019

1. Find a differentiable function f : R R such that f does not have an extremum at its critical point.

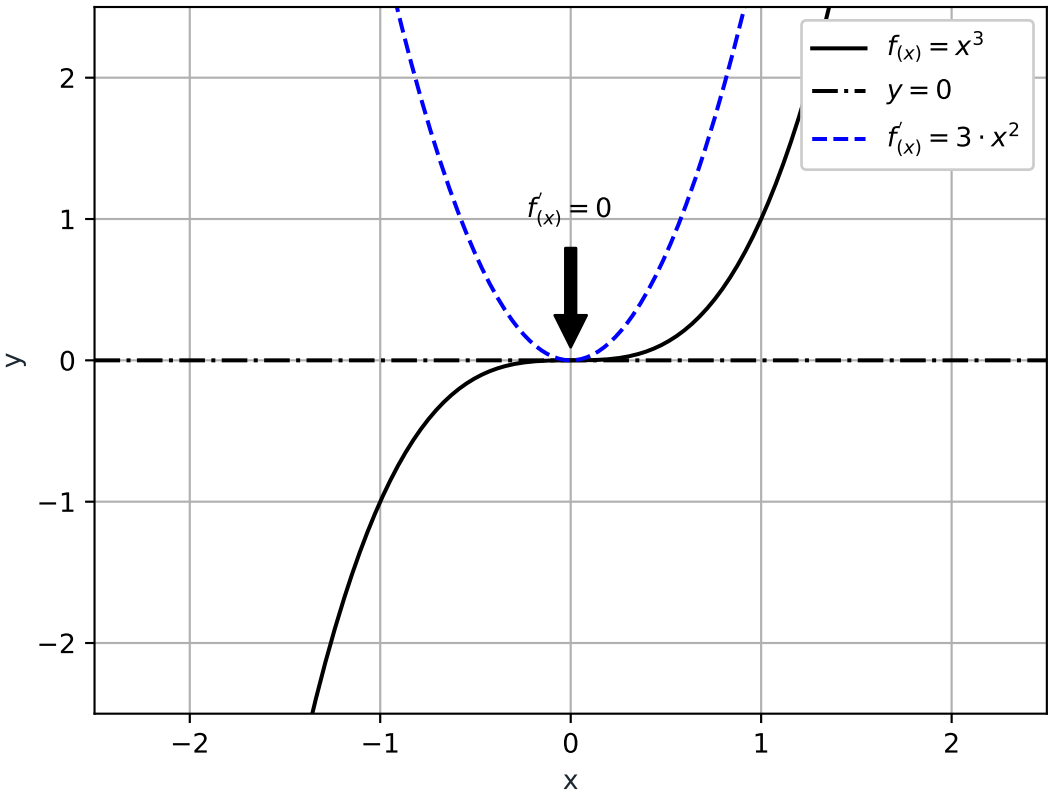

Figure 1: An example of a differentiable function $f : \mathbb{R} \to \mathbb{R}$ which does not have an extremum at its critical point

2. Given a positive integer S, which decompositions a1 + + an = S with the ai positive integers have the largest product a1 an?

3. Find the optimal solution to the Diet Problem when the cost function is Cost(x1, x2) = x1 + x2.

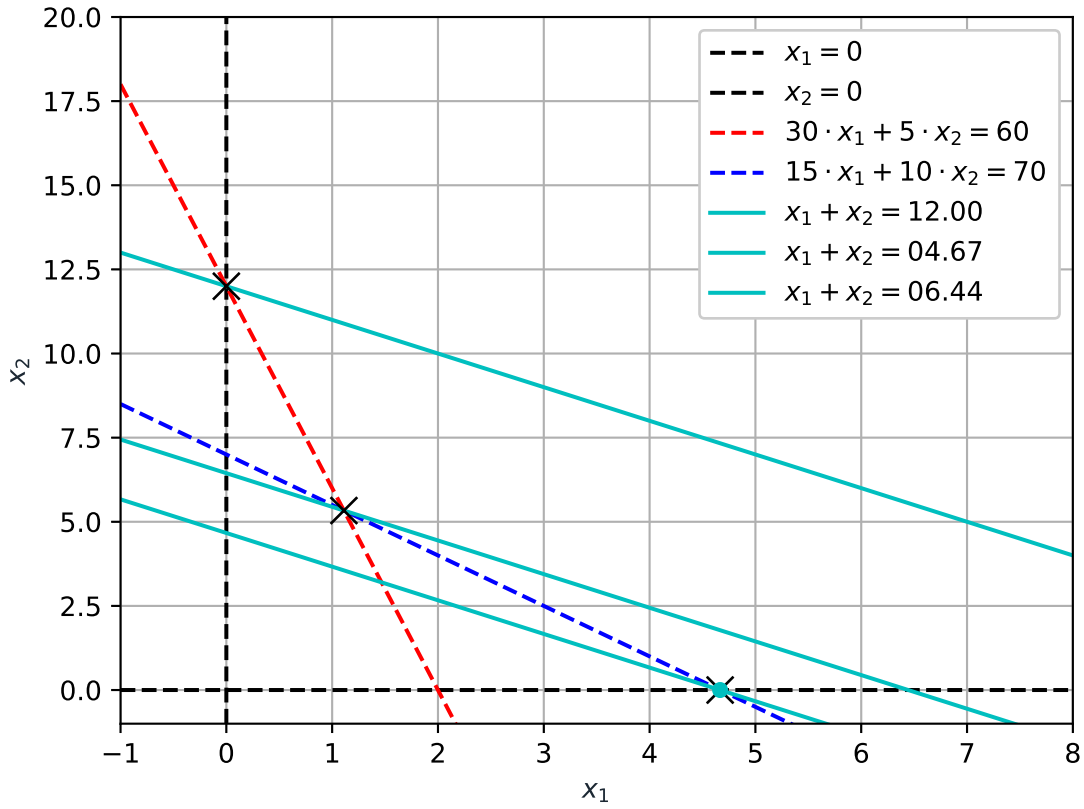

Figure 2: The Optimal Solution to the Diet Problem when the total cost is given by the function $Cost(x_1, x_2) = x_1 \cdot x_2$

4. Let A,B Rnn. Show that the traditional way of computing their product AB requires a total of (2n 1)n2 arithmetic operations.

5. Consider the problem of solving a system of n linear equations in n unknowns. Show that the Gaussian elimination method requires O(n3) arithmetic operations in order to either compute a solution or to decide that no solution exist.

6. Suppose that we are given a set of vectors in Rn that form a basis and let y be an arbitrary vector in Rn. We wish to express y as a linear combination of the basis vectors. How can this by accomplished?

7. Study the paper with title: Do dogs know Calculus? found in the Readings folder.