Machine Learning

Assignment 3

75 Points

1. (15 points) Define briefly:

    (a) (5 points) Machine learning (ML)
    (b) (5 points) Data mining (DM).
    (c) (5 points) What are the commonalities and differences between ML and DM?

    Hint: See Internet. Please be brief and precise.

2. (20 points) Give two definitions of a convex function of a single variable.

    Hint: See class notes.

3. (40 points) Find the local maxima and minima, if any, of the following functions.

    (a) $x^3 - 12x + 1$
    (b) $x^4 - 4x^3 + 6x^2 - 4x + 1$
    (c) $x^5 - 5x^4 + 10x^3 - 10x^2 + 5x - 1$
    (d) $(4 - 2x)\, e^{x^2}$

    Answers

    (a) Local minima at $x = +2$, and local maxima at $x = -2$.
    (b) Local minima at $x = +1$.
    (c) Neither local maxima nor local minima exists.
    (d) Local minima at $x = \left(1 - 1/\sqrt{2}\right)$, and local maxima at $x = \left(1 + 1/\sqrt{2}\right)$.