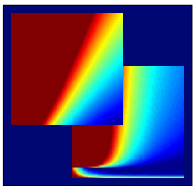
Learning From Data
Caltech - **edX** CS1156x
https://www.edx.org/course/learning-data-introductory-machine-caltechx-cs1156x
Fall 2017



Homework # 0

This is not a required homework. It is just for practice.

*All questions have multiple-choice answers (***[a], [b], [c], ...***). This is just a practice homework that does not count in the grade, and you can discuss it freely (this homework only).*

- **Basic Calculus**

1. What is the gradient of $f(x, y) = x^2 + y^2$?

[a] $\begin{bmatrix} x^2 \\ y^2 \end{bmatrix}$

[b] $\begin{bmatrix} -2y \\ -2x \end{bmatrix}$

[c] $\begin{bmatrix} 2x \\ 2y \end{bmatrix}$

[d] $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$

[e] None of the above

- **Basic Probability**

2. Suppose X is a uniform random variable on $[0, 1]$. What is the expected value of X?

[a] 0

[b] 1/4

[c] 1/3

[d] 1/2

[e] There is not enough information to determine the expectation.

- **Basic Linear Algebra**

3. What is the inverse of the matrix $\begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$?

[a] $\begin{bmatrix} 1 & 0 \\ 0 & 1/2 \end{bmatrix}$

[b] $\begin{bmatrix} -1 & 0 \\ 0 & -2 \end{bmatrix}$

[c] $\begin{bmatrix} 0 & 1 \\ 2 & 0 \end{bmatrix}$

[d] $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

[e] The matrix is not invertible.