# CSE-5819 Written Assignment 1

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#### Q1. Linear Algebra and Probability

**（1）**

Answers:

For given vectors, can get:



Then execute the result of different norm functions:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | **My final answer** |
| (a) | 3 | 2 | 4 |  |
| (b) | 1.4 | 1.3 | 1.3 |  |
| (c) |  |  |  |  |
| (d) | 0.7 | 0.8 | 0.8 |  |

**（2）**

Answers:



**（3）**

Answer:

Firstly, use w=2 to re-write the p(x) function:

 if x < 0

 if 0 <= x <= 2

 if x > 2

Then:



**（4）**

Answer:

Firstly, write the likelihood function



Secondly, execute the log



Finally MLE:



#### Q2. Introduction to Optimization

**(1)**

Answer:

False

Reason: the definition of optimization problem is



So I think it is a minimization problem.

**(b)**

Here I use the ? to judge whether f(x) is convex on 



When , The result for is always True. So it is convex.

**(2)**

Answer:

When use Lagrange multipliers, we can get:



Then, calculate:



Based on these equations,



Then, use the first and second equation, we can get 

Finally, we can get:



#### Q3. Linear Regression

Answer:

**(a)**



Because the obeys the normalization distribution, It is a scalar, Then



Then



Finally, transpose both sides of the equal sign, We can get the w based on X and y



**(b)**

