## 1 Linear Regression

### 1.1 Derivation of regularized Linear Regression

#### 1.1.1 Preliminary questions

1. Mike
2. If we consider the cost function , the gradient represents the derivative of the cost function with respect to every parameter and it can be calculated as follows

Let

Then

The result is an columns vector.

1. The Jacobian matrix is a generalization of the gradient. In general we talk about gradient when we are working on functions that maps , so the Jacobian matrix in this case would just be a vector. We talk about Jacobian matrix when working on functions mapping .

If we have a vector function that maps , where

The Jacobian matrix is defined as