Optional Lab - Regularized Cost and Gradient

Goals

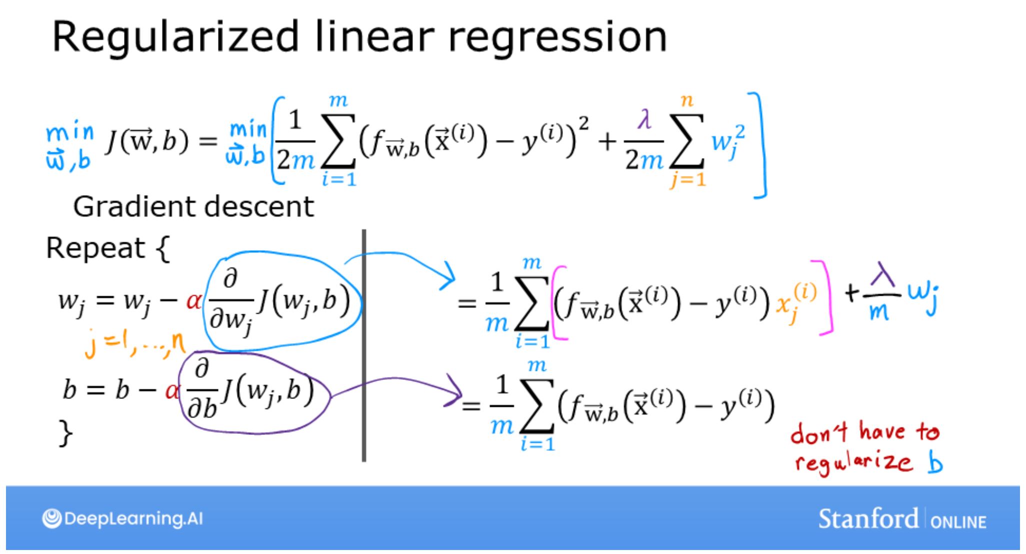
In this lab, you will:

- extend the previous linear and logistic cost functions with a regularization term.
- rerun the previous example of over-fitting with a regularization term added.

In [ ]:

```
import numpy as np
%matplotlib widget
import matplotlib.pyplot as plt
from plt_overfit import overfit_example, output
from lab_utils_common import sigmoid
np.set_printoptions(precision=8)
```

Adding regularization ¶



Regularized linear regression

$$\min_{\vec{w},b} J(\vec{w},b) = \min_{\vec{w},b}\left[\frac{1}{2m}\sum_{i=1}^{m}\left(f_{\vec{w},b}(\vec{x}^{(i)}) - y^{(i)}\right)^2 + \frac{\lambda}{2m}\sum_{j=1}^{n} w_j^2\right]$$

Gradient descent

Repeat {

$$w_j = w_j - \alpha \frac{\partial}{\partial w_j} J(w_j,b) \quad = \frac{1}{m}\sum_{i=1}^{m}\left[\left(f_{\vec{w},b}(\vec{x}^{(i)}) - y^{(i)}\right) x_j^{(i)}\right] + \frac{\lambda}{m} w_j$$

$j = 1, \ldots, n$

$$b = b - \alpha \frac{\partial}{\partial b} J(w_j,b) \quad = \frac{1}{m}\sum_{i=1}^{m}\left(f_{\vec{w},b}(\vec{x}^{(i)}) - y^{(i)}\right)$$

}

don't have to regularize b

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