REGULARIZATION FOR LOGISTIC REGRESSION

$$J(\theta) = -\frac{1}{m}\sum_{i=1}^{m}\left[y^{(i)}\log h_\theta(x^{(i)}) + (1-y^{(i)})\log(1-h_\theta(x^{(i)}))\right] + \frac{\lambda}{2m}\sum_{j=1}^{n}\theta_j^2$$

IN GRADIENT DESCENT

$$\theta_0 := \theta_0 - \frac{\alpha}{m}\sum_{i=1}^{m}\left(h_\theta(x^{(i)}) - y^{(i)}\right)x_0^{(i)}$$

$$\theta_j := \theta_j - \frac{\alpha}{m}\left[\sum_{i=1}^{m}\left(h_\theta(x^{(i)}) - y^{(i)}\right)x_j^{(i)} + \lambda\theta_j\right]$$

IN ADVANCED OPTIMIZATION METHODS

```
function [jVal, gradient] = costFunction(theta)
    jVal = code to compute J(θ)                ;
    gradient(1) = code to compute ∂J(θ)/∂θ0    ;
        ⋮
    gradient(n+1) = code to compute ∂J(θ)/∂θn  ;
```

```
[theta, cost] = ...
↳ fminunc(@costFunction, initialTheta, options);
```

and: `options = optimset('GradObj', 'on', 'MaxIter', 100);`

Resultados do exercício-programa sobre Regressão Logística com regularização

Dados: X_1 e X_2

Features ~~criados~~ usados: $1, X_1, X_2, X_1^2, X_1X_2, X_2^2, X_1^3, X_1^2 \cdot X_2, X_1 \cdot X_2^2, X_2^3, X_1^4, \ldots$

ordem de expansão do binômio de Newton	# features (including '1')	Accuracy to predict the training set
1	3	54,24%
2	6	81,36%
3	10	80,51%
4	15	82,20%
5	21	83,90%
6	28	$\boxed{83{,}05\%}$
7	36	$\boxed{83{,}05\%}$
8	45	$\boxed{83{,}05\%}$