



deeplearning.ai

# Basics of Neural Network Programming

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## Vectorization

# What is vectorization?



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## More vectorization examples

# Neural network programming guideline

Whenever possible, avoid explicit for-loops.

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# Vectors and matrix valued functions

Say you need to apply the exponential operation on every element of a matrix/vector.

$$v = \begin{bmatrix} v_1 \\ \vdots \\ v_n \end{bmatrix}$$

```
u = np.zeros( (n,1) )  
for i in range(n):  
    u[i]=math.exp(v[i])
```

# Logistic regression derivatives

$J = 0, \quad dw_1 = 0, \quad dw_2 = 0, \quad db = 0$

for  $i = 1$  to  $n$ :

$$z^{(i)} = w^T x^{(i)} + b$$

$$a^{(i)} = \sigma(z^{(i)})$$

$$J += -[y^{(i)} \log \hat{y}^{(i)} + (1 - y^{(i)}) \log(1 - \hat{y}^{(i)})]$$

$$dz^{(i)} = a^{(i)}(1 - a^{(i)})$$

$$dw_1 += x_1^{(i)} dz^{(i)}$$

$$dw_2 += x_2^{(i)} dz^{(i)}$$

$$db += dz^{(i)}$$

$J = J/m, \quad dw_1 = dw_1/m, \quad dw_2 = dw_2/m, \quad db = db/m$