Vectorizing Logistic Regression

The *Sigmoid Function* of $\frac{1}{1+e^{-z}}$ is used when computing the hypothesis for logistic regression which means that the normal vectorized compute of $\theta^T X$ is not going to work in this case since the *Sigmoid Function* would not be applied. Using victor math this can be achieved using the following:

$$\vec{Z} = w^T X + \vec{b}$$

Where

$$X = \begin{bmatrix} x_1^{(1)} & x_2^{(1)} & x_3^{(1)} & x_n^{(1)} \\ x_1^{(2)} & x_2^{(2)} & x_3^{(2)} & x_n^{(2)} \\ x_1^{(3)} & x_2^{(3)} & x_3^{(3)} & x_n^{(3)} \end{bmatrix}$$

$$w^T = \begin{bmatrix} \theta_1 & \theta_2 & \theta_3 & \theta_n \end{bmatrix}$$

$$\vec{b} = \begin{bmatrix} \theta_0 & \theta_0 & \theta_0 & \dots \end{bmatrix}$$

From there we can take $\vec{Z}$ and pass to our Sigmoid Function:

$$h_\theta(x) = S(\vec{Z})$$