Matrix Multiplication II

$$\begin{bmatrix} 1 & 3 & 2 \\ 4 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 \\ 0 & 1 \\ 5 & 2 \end{bmatrix} = \begin{bmatrix} 11 & 10 \\ 9 & 14 \end{bmatrix}$$

2×3 $\quad 3 \times 2 \quad$ 2×2

$$A \times B = C$$

$m \times n \quad n \times o \quad m \times o$

for vectors: $o = 1$

Assume feature $\begin{bmatrix} 2104 \\ 1604 \\ 510 \\ 1203 \end{bmatrix}$ and 3 hypothesis $h_\theta^1(x)$, $h_\theta^2(x)$, $h_\theta^3(x)$

h_θ^1: $-40 + 0.25x$

h_θ^2: $200 + 3x$

h_θ^3: $-150 + 0.4x$

$$\begin{bmatrix} 1 & 2104 \\ 1 & 1604 \\ 1 & 510 \\ 1 & 1203 \end{bmatrix} \times \begin{bmatrix} -40 & 200 & -150 \\ 0.25 & 3 & 0.4 \end{bmatrix} = \begin{bmatrix} \circ & \circ & \circ \\ \circ & \circ & \circ \\ \circ & \circ & \circ \\ \circ & \circ & \circ \end{bmatrix}$$

$4 \times 2 \quad 2 \times 3 = 4 \times 3$

$\Rightarrow$ Test all 3 hypotheses on your data set with matrix multiplication

Note: Mat-Mul is not commutativ ($A \times B \neq B \times A$)

but: $(A \times B) \times C = A \times (B \times C)$ [associative]

Further: $I = \begin{bmatrix} 1 & & 0 \\ & \ddots & \\ 0 & & 1 \end{bmatrix}$

For any matrix A,

$$A \times I = I \times A = A$$