Predicting exam score:
regression using three inputs (x1, x2, x3)

multi-variable/feature

x_1 (quiz 1)	x_2 (quiz 2)	x_3 (midterm 1)	Y (final)
73	80	75	152
93	88	93	185
89	91	90	180
96	98	100	196
73	66	70	142

Test Scores for General Psychology

점수들 토대로
final 점수 예측이
가능할까?

✳ Hypothesis

$H(x) = Wx + b$

$H(x_1, x_2, x_3) = w_1x_1 + w_2x_2 + w_3x_3 + b$

✳ Cost function

$cost(W,b) = \frac{1}{m}\sum_{i=1}^{m}(H(x_1^{(i)}, x_2^{(i)}, x_3^{(i)}) - y^{(i)})^2$

✳ Matrix

$w_1x_1 + w_2x_2 + w_3x_3 + \cdots + w_nx_n$

(Matrix 곱셈만 사용! cf> $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} \quad \end{bmatrix}$)

$(x_1 \; x_2 \; x_3) \cdot \begin{pmatrix} w_1 \\ w_2 \\ w_3 \end{pmatrix} = x_1w_1 + x_2w_2 + x_3w_3$

$H(X) = XW$

Hypothesis using matrix

$$H(x_1, x_2, x_3) = x_1w_1 + x_2w_2 + x_3w_3$$

x_1	x_2	x_3	Y
73	80	75	152
93	88	93	185
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Test Scores for General Psychology

$$\begin{pmatrix} x_1 & x_2 & x_3 \end{pmatrix} \cdot \begin{pmatrix} w_1 \\ w_2 \\ w_3 \end{pmatrix} = \begin{pmatrix} x_1w_1 + x_2w_2 + x_3w_3 \end{pmatrix}$$

$$H(X) = XW$$

매트릭스 장점 ⇒ 계산 한방에!

[5,3] [3,1] ⇒ [5,1]

- [5,3]: instance 갯수 (입력 갯수)
- 3: variable 갯수
- 3: 같아야댐.
- [5,1]: 출력의 갯수.

[5,3] × [?,?] = [5,1] 이면,

[3,1] 로 W 추정할 수 있음

⊛ WX vs XW

- Theory : $H(x) = Wx + b$
- 구현 : $H(X) = XW$