**Linear Algebra Refresher**

### Three multiplications

Vector-vector multiplication

* Inner product = dot product. Result is scalar
* Outer product results in matrix. Why is it useful?

Matrix-vector multiplication

A (m x n) x(n x 1) = vector (m x1)

Matrix-matrix multiplication

A (m x n) x B (n x p) = C (m x p)

### Hessian

Positive Definite Hessian = Local Minimum

Negative Definite Hessian = Local Maximum

Indefinite Hessian = Saddle point

Other definiteness = Test is inconclusive