

## Quiz #14 (Vector Spaces, Operators and Matrices)

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Quantum Mechanics

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### Prob.1(2)

Determine what each of following expressions corresponds to: column vector, row vector, matrix, or complex number. Assume bra and ket vectors have dimension of  $N$ , and the matrix has dimension of  $N \times N$ .

(a)  $\langle f | \hat{A}$

(b)  $|f\rangle\langle g|$

(c)  $\hat{A}|f\rangle\langle g|$

(d)  $\hat{A}^+|f\rangle(|f\rangle)^+$

### Prob. 2(2)

Consider a particle having mass  $M$  in a quantum well with length  $L$  having infinite barriers. Determine the expression for the Hamiltonian operator *matrix* using the basis  $|\psi_n\rangle$ , the eigen state for above quantum well.