

## Quiz #15 (Types of Linear Operators)

Nov. 14, 2016

Quantum Mechanics

Prof. Woo-Young Choi

Dept. of Electrical and Electronic Engineering

Yonsei University

### Prob.1(1)

For  $|f\rangle = \begin{bmatrix} i \\ 2 \\ -3 \end{bmatrix}$  and  $|g\rangle = \begin{bmatrix} 4 \\ -5i \\ 6 \end{bmatrix}$ , determine  $|f\rangle\langle g|$ .

### Prob. 2(2)

Determine whether  $\hat{A} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$  is a unitary operator or not.

### Prob. 3(2)

Show that the trace of an operator,  $\hat{A}$ , is independent of the orthonormal bases used for representing the operator. Use two different set of orthonormal bases  $|\psi_n\rangle$  and  $|\phi_n\rangle$ .