## **Physics 412—Discrete and Continuous Bases**

Complete the following table.

Discrete Basis  $\{|a_i\rangle\}$ 

Coordinate Basis  $\{|x\rangle\}$ 

Momentum Basis  $\{|p\rangle\}$ 

(1) 
$$A|a_i\rangle = a_i|a_i\rangle$$

(2) 
$$\langle a_i | a_j \rangle = \delta_{ij}$$

(3) 
$$c_i = \langle a_i | \Psi \rangle$$

$$(4) |\Psi\rangle = \sum_{i} c_{i} |a_{i}\rangle$$

$$(5) |\Psi\rangle \leftrightarrow \begin{bmatrix} c_1 \\ c_2 \\ \vdots \\ c_n \end{bmatrix}$$

(6) 
$$\langle \Psi | \leftrightarrow \begin{bmatrix} c_1^* & c_2^* & \cdots & c_n^* \end{bmatrix}$$

(7) 
$$P(a_i) = |\langle a_i | \Psi \rangle|^2$$

(8) 
$$I = \sum_{i} |a_i\rangle\langle a_i|$$

(9) 
$$D_{ij} = \langle a_i | D | a_j \rangle$$