	3D vectors	Wavefunction Vectors (discrete)	Wavefunction (continuum) example – Fourier Analysis
Addition/ Subtraction	$\vec{A} + \vec{B}$	$\psi_a(x) + \psi_b(x)$	
Scalar Mult.	$c\vec{A}$	$c\,\psi_a(x)$	
Dot Product	$\vec{A}\cdot\vec{B} \geq 0$	$\int dx\, \psi_a^*(x)\,\psi_b(x)$	
	$\vec{A}\cdot\vec{A} \geq 0$	$\int dx\, \psi_a^*(x)\,\psi_a(x) \geq 0$	
Basis	$\hat{x}, \hat{y}, \hat{z}$	$u_n(x)$	$u_k(x) = e^{ikx}$
Orthonormal	$\hat{x}\cdot\hat{x} = 1 \ldots$ $\hat{x}\cdot\hat{y} = 0 \ldots$	$\int dx\, u_n(x)^* u_m(x) = \delta_{nm}$	$\int dx\, u_k(x)^* u_{k'}(x) = 2\pi\,\delta(k-k')$
Components	$A_x = \hat{x}\cdot\vec{A}$	$A_n = \int dx'\, u_n(x')^*\, \psi_a(x')$	$A_k = \int dx'\, u_k(x')^*\, \psi(x)$
Basis Notation	$\vec{A} = A_x\hat{x} + A_y\hat{y} + A_z\hat{z}$ $= \hat{x}\,\hat{x}\cdot\vec{A} + \hat{y}\,\hat{y}\cdot\vec{A} + \cdots$	$\psi_a(x) = \sum_{n=1}^{\infty} A_n\, u_n(x)$ $= \int dx' \left(\sum_{n=1}^{\infty} u_n(x')^* u_n(x)\right) \psi_a(x')$	$\psi(x) = \int \frac{dk}{2\pi}\, A_k\, u_k(x)$
Completeness	$\mathbb{1} = \hat{x}\,\hat{x}\cdot + \hat{y}\,\hat{y}\cdot + \hat{z}\,\hat{z}\cdot$	$\delta(x-x') = \sum_{n=1}^{\infty} u_n(x')^*\, u_n(x)$	$\delta(x-x') = \int \frac{dk}{2\pi}\, u_k(x')^*\, u_k(x)$

Dirac Notation	Real Space Example
$\|a\rangle + \|b\rangle$	
$c\|a\rangle$	
$\langle a\|b\rangle$	
$\|n\rangle$	$\|x_0\rangle = \delta(x-x_0)$
$\langle n\|m\rangle = \delta_{nm}$	$\langle x_0\|m\rangle = \int dx\, \delta(x-x_0)^* u_m(x) = u_m(x_0)$
$A_n = \langle n\|a\rangle$	$\psi_a(x) = \langle x\|a\rangle$
$\|a\rangle = \sum_{n=1}^{\infty} \|n\rangle\langle n\|a\rangle$	$\|a\rangle = \int dx\, \|x\rangle\langle x\|a\rangle = \int dx\, \psi_a(x)\|x\rangle$
$1 = \sum_{n=1}^{\infty} \|n\rangle\langle n\|$	$1 = \int dx\, \|x\rangle\langle x\|$
	$\delta(x-x') = \langle x\|x'\rangle = \int dx''\, \delta(x-x'')\delta(x'-x'')$