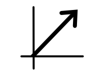
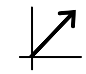
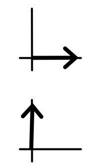
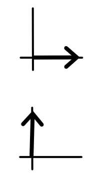
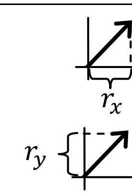
Word	Bra-ket	$\hat{\imath}$ & $\hat{\jmath}$ Vectors	Matrix	Arrows
Vector	$\lvert r\rangle$	$\vec{r} = r_x\hat{\imath} + r_y\hat{\jmath}$	$\begin{pmatrix} r_x \\ r_y \end{pmatrix}$	
Adjoint Vector	$\langle r\rvert$	$\vec{r}^{\dagger} = r_x{}^{*}\hat{\imath} + r_y{}^{*}\hat{\jmath}$	$\begin{pmatrix} r_x{}^{*} & r_y{}^{*} \end{pmatrix}$	
Ket Basis	$\lvert 1\rangle$ $\lvert 2\rangle$	$\hat{\imath}$ $\hat{\jmath}$	$\begin{pmatrix} 1 \\ 0 \end{pmatrix}$ $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$	
Bra Basis	$\langle 1\rvert$ $\langle 2\rvert$	$\hat{\imath}$ $\hat{\jmath}$	$\begin{pmatrix} 1 & 0 \end{pmatrix}$ $\begin{pmatrix} 0 & 1 \end{pmatrix}$	
Orthogonality	$\langle 1\vert 2\rangle$	$\hat{\imath}\cdot\hat{\jmath}$	$\begin{pmatrix} 1 & 0 \end{pmatrix}\begin{pmatrix} 0 \\ 1 \end{pmatrix} = 0$	
Normalization	$\langle 1\vert 1\rangle$ $\langle 2\vert 2\rangle$	$\hat{\imath}\cdot\hat{\imath}$ $\hat{\jmath}\cdot\hat{\jmath}$	$\begin{pmatrix} 1 & 0 \end{pmatrix}\begin{pmatrix} 1 \\ 0 \end{pmatrix} = 1$ $\begin{pmatrix} 0 & 1 \end{pmatrix}\begin{pmatrix} 0 \\ 1 \end{pmatrix} = 1$	
Length (Real)	$\langle r\vert r\rangle = \big(r_x\langle 1\rvert + r_y\langle 2\rvert\big)\big(r_x\lvert 1\rangle + r_y\lvert 2\rangle\big)$ $= r_x{}^2\langle 1\vert 1\rangle + r_x r_y\langle 1\vert 2\rangle$ $+ r_y r_x\langle 2\vert 1\rangle + r_y{}^2\langle 2\vert 2\rangle$ $= r_x{}^2 + r_y{}^2$	$\vec{r}\cdot\vec{r} = (r_x\hat{\imath} + r_y\hat{\jmath})\cdot(r_x\hat{\imath} + r_y\hat{\jmath})$ $= r_x{}^2\hat{\imath}\cdot\hat{\imath} + r_x r_y\hat{\imath}\cdot\hat{\jmath}$ $+ r_y r_x\hat{\jmath}\cdot\hat{\imath} + r_y{}^2\hat{\jmath}\cdot\hat{\jmath}$ $= r_x{}^2 + r_y{}^2$	$\begin{pmatrix} r_x & r_y \end{pmatrix}\begin{pmatrix} r_x \\ r_y \end{pmatrix} = r_x{}^2 + r_y{}^2$	
Components (Real)	$\langle 1\vert r\rangle = \langle 1\rvert\big(r_x\lvert 1\rangle + r_y\lvert 2\rangle\big) = r_x\langle 1\vert 1\rangle + r_y\langle 1\vert 2\rangle$ $= r_x$ $\langle 2\vert r\rangle = \langle 2\rvert\big(r_x\lvert 1\rangle + r_y\lvert 2\rangle\big) = r_x\langle 2\vert 1\rangle + r_y\langle 2\vert 2\rangle$ $= r_y$	$\hat{\imath}\cdot\vec{r} = \hat{\imath}\cdot(r_x\hat{\imath} + r_y\hat{\jmath}) = r_x\hat{\imath}\cdot\hat{\imath} + r_y\hat{\imath}\cdot\hat{\jmath}$ $= r_x$ $\hat{\jmath}\cdot\vec{r} = \hat{\jmath}\cdot(r_x\hat{\imath} + r_y\hat{\jmath}) = r_x\hat{\jmath}\cdot\hat{\imath} + r_y\hat{\jmath}\cdot\hat{\jmath}$ $= r_y$	$\begin{pmatrix} 1 & 0 \end{pmatrix}\begin{pmatrix} r_x \\ r_y \end{pmatrix} = r_x$ $\begin{pmatrix} 0 & 1 \end{pmatrix}\begin{pmatrix} r_x \\ r_y \end{pmatrix} = r_y$	
Inner Product (Real)	$\langle s\vert r\rangle = \big(s_x\langle 1\rvert + s_y\langle 2\rvert\big)\big(r_x\lvert 1\rangle + r_y\lvert 2\rangle\big)$ $= s_x r_x\langle 1\vert 1\rangle + s_x r_y\langle 1\vert 0\rangle$ $+ s_y r_x\langle 0\vert 1\rangle + s_y r_y\langle 0\vert 0\rangle$ $= s_x r_x + s_y r_y$	$\vec{s}\cdot\vec{r} = (s_x\hat{\imath} + s_y\hat{\jmath})\cdot(r_x\hat{\imath} + r_y\hat{\jmath})$ $= s_x r_x\hat{\imath}\cdot\hat{\imath} + s_x r_y\,\hat{\imath}\cdot\hat{\jmath}$ $+ s_y r_x\hat{\jmath}\cdot\hat{\imath} + s_y r_y\hat{\jmath}\cdot\hat{\jmath}$ $= s_x r_x + s_y r_y$	$\begin{pmatrix} s_x & s_y \end{pmatrix}\begin{pmatrix} r_x \\ r_y \end{pmatrix} = s_x r_x + s_y r_y$	

Word	Bra-ket	$\hat{\imath}$ & $\hat{\jmath}$ Vectors	Matrix	Arrows
Length (Complex)	$\langle r\|r\rangle = \left(r_x{}^*\langle 1\| + r_y{}^*\langle 2\|\right)\left(r_x\|1\rangle + r_y\|2\rangle\right)$ $= r_x{}^* r_x\langle 1\|1\rangle + r_x{}^* r_y\langle 1\|2\rangle$ $+ r_y{}^* r_x\langle 2\|1\rangle + r_y{}^* r_y\langle 2\|2\rangle$ $= r_x{}^* r_x + r_y{}^* r_y = \|r_x\|^2 + \left\|r_y\right\|^2$		$\begin{pmatrix} r_x{}^* & r_y{}^* \end{pmatrix}\begin{pmatrix} r_x \\ r_y \end{pmatrix} = \|r_x\|^2 + \left\|r_y\right\|^2$	
Components (Complex)	$\langle 1\|r\rangle = \langle 1\|\left(r_x\|1\rangle + r_y\|2\rangle\right) = r_x\langle 1\|1\rangle + r_y\langle 1\|2\rangle$ $= r_x$ $\langle 2\|r\rangle = \langle 2\|\left(r_x\|1\rangle + r_y\|2\rangle\right) = r_x\langle 2\|1\rangle + r_y\langle 2\|2\rangle$ $= r_y$		$\begin{pmatrix} 1 & 0 \end{pmatrix}\begin{pmatrix} r_x \\ r_y \end{pmatrix} = r_x$ $\begin{pmatrix} 0 & 1 \end{pmatrix}\begin{pmatrix} r_x \\ r_y \end{pmatrix} = r_y$	
Inner Product (Complex)	$\langle s\|r\rangle = \left(s_x{}^*\langle 1\| + s_y{}^*\langle 2\|\right)\left(r_x\|1\rangle + r_y\|2\rangle\right)$ $= s_x{}^* r_x\langle 1\|1\rangle + s_x{}^* r_y\langle 1\|2\rangle$ $+ s_y{}^* r_x\langle 2\|1\rangle + s_y{}^* r_y\langle 2\|2\rangle$ $= s_x{}^* r_x + s_y{}^* r_y$		$\begin{pmatrix} s_x{}^* & s_y{}^* \end{pmatrix}\begin{pmatrix} r_x \\ r_y \end{pmatrix} = s_x{}^* r_x + s_y{}^* r_y$	