

MA 439 - Math of Image Processing

Quiz #1

Professor Broughton

Name: _____

Box #: _____

You may use this table

Angle	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1

1. What is $E_{8,5}$?

2. Let $X = E_{6,1} + E_{6,5}$, $Y = E_{6,1} - E_{6,5}$.

Compute:

$$X = [\quad \quad \quad]^T$$

$$Y = [\quad \quad \quad]^T$$

$$X \bullet E_{6,0} =$$

$$X \bullet E_{6,1} =$$

$$X \bullet E_{6,5} =$$

3. Are X and Y orthogonal?

4. Recall that the energy of a signal X of N samples may be defined as:

$$\text{energy}(X) = \frac{\|X\|^2}{N}$$

Show that

$$\text{energy}(X) = \text{energy}(Y)$$

5. Fill in the question marks so that X is a real signal

$$X = E_{6,1} + 2E_{6,2} + ?E_{6,4} + E_{6,?}$$