CS491/CS691 Quiz 9 Name Solution

1. For the following matrix, decide which, if any, of the following vectors are eigenvectors and give the corresponding eigenvalue. (8 points)

$$\begin{bmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{bmatrix} \quad \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix} \quad \begin{bmatrix} -1 \\ 0 \\ 2 \end{bmatrix} \quad \begin{bmatrix} -1 \\ 1 \\ 3 \end{bmatrix} \quad \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} \quad \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$$

(1) ✓ (2) ✗ (3) ✗ (4) ✓ (5) ✗

$1-3+6=4$
$3-5+6=4$
$6-6+8=8$

$3-6+3=0$

$-1+6=5$
$-3+6=3$
$-1-3+9=5$
$-3-5+9=1$
$-3+3=0$
$-5+3=-2$
$-6+4=-2$

$1 \quad 3 \quad 4$
$\lambda=4 \quad \lambda=-2$

2. Given the following eigenvector $v = (3, 4)$ and sample $s = (1, 2)$, project the sample s onto the eigenvector v. (2 points)

$\|v\|=5 \quad v=\left(\frac{3}{5}, \frac{4}{5}\right) \cdot (1, 2)$

$\frac{3}{5}+\frac{8}{5}=\frac{11}{5}$