GSI: CHRISTOPHER EUR, DATE: 10/21/2016

STUDENT NAME: _____

Problem 1. (5 points) Let $\mathcal{P}_2$ be as usual. Consider the bases $B = (1 + x, x^2 - x, x^2 + x)$ and $C = (1 - x, 1 + x, x^2 + 2x)$. Find the change of basis matrix $\underset{C \leftarrow B}{P}$ (which converts coordinates w/r/t B into coordinates w/r/t/ C). [Hint: the diagram below may make your life easier, where $E = (1, x, x^2)$ is another basis of $\mathcal{P}_2$ that is easy to work with]

$$
\begin{array}{ccccc}
\mathcal{P}_2 & \xrightarrow{\ \text{Id}\ } & \mathcal{P}_2 & \xrightarrow{\ \text{Id}\ } & \mathcal{P}_2 \\
{\scriptstyle B}\Big\uparrow{\scriptstyle \sim} & & {\scriptstyle E}\Big\uparrow{\scriptstyle \sim} & & {\scriptstyle C}\Big\uparrow{\scriptstyle \sim} \\
\mathbb{R}^3 & \xrightarrow[\ (\underset{E \leftarrow B}{P})\ ]{} & \mathbb{R}^3 & \xrightarrow[\ (\underset{C \leftarrow E}{P})\ ]{} & \mathbb{R}^3
\end{array}
$$

Problem 2. (5 points) Find all eigenvalues and corresponding eigenvectors of the matrix $\begin{bmatrix} 4 & 2 \\ -5 & -3 \end{bmatrix}$.