Question: 1.(a)

Answer: Given, $V = \mathbb{P}_2$ with the ordered basis $\mathcal{S} = \left(p_0 = 1,\ p_1 = x,\ p_2 = x^2\right)$

And the given polynomial is $r(x) = 2 + 3x - x^2$ is,

$\therefore$ the components of $r(x)$ in basis $\mathcal{S}$ is

$$\mathrm{r}_{\mathcal{S}} = \begin{bmatrix} 2 \\ 3 \\ -1 \end{bmatrix} \tag{1}$$

Question: 1.(b)

Answer: