HOMEWORK

1)

In each part, determine whether the vectors are linearly independent or are linearly dependent in P_2.

(a) $2 - x + 4x^2$, $3 + 6x + 2x^2$, $2 + 10x - 4x^2$

(b) $1 + 3x + 3x^2$, $x + 4x^2$, $5 + 6x + 3x^2$, $7 + 2x - x^2$

2)

In each part, determine whether the three vectors lie on the same line in R^3.

(a) $v_1 = (-1, 2, 3)$, $v_2 = (2, -4, -6)$, $v_3 = (-3, 6, 0)$

(b) $v_1 = (2, -1, 4)$, $v_2 = (4, 2, 3)$, $v_3 = (2, 7, -6)$

(c) $v_1 = (4, 6, 8)$, $v_2 = (2, 3, 4)$, $v_3 = (-2, -3, -4)$

3)

For which real values of λ do the following vectors form a linearly dependent set in R^3?

$v_1 = \left(\lambda, -\tfrac{1}{2}, -\tfrac{1}{2}\right)$, $v_2 = \left(-\tfrac{1}{2}, \lambda, -\tfrac{1}{2}\right)$, $v_3 = \left(-\tfrac{1}{2}, -\tfrac{1}{2}, \lambda\right)$

4)

Determine all values of k for which the following matrices are linearly independent in M_{22}.

$$\begin{bmatrix} 1 & 0 \\ 1 & k \end{bmatrix}, \quad \begin{bmatrix} -1 & 0 \\ k & 1 \end{bmatrix}, \quad \begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}$$