MATH 2130 LINEAR ALGEBRA
HOMEWORK 12
DUE 2025 NOVEMBER 16

Problem 1 (S8)

Let $f\colon \mathbb{R}^2 \to \mathbb{R}^2$ by given by $f(x,y) = (x+2y, 3x+6y)$ and let $B = \{(1,3),(2,-1)\}$ be a basis for $\mathbb{R}^2$. Find $[f]_B^B$.

Problem 2 (S8)

Let $f\colon \mathbb{R}^2 \to \mathbb{R}^2$ by given by $f(x,y) = (x+2y, 3x+6y)$ and let $B = \{(1,3),(2,-1)\}$ and $C = \{(1,2),(1,3)\}$ be bases for $\mathbb{R}^2$. Find $[f]_B^C$.

Problem 3 (S8)

Let $g\colon \mathcal{P}_2 \to \mathbb{R}^3$ be given by $g(ax^2+bx+c) = (a+b+c, 2a-b, c)$ and let $B = \{x^2+1, x^2+2, x^2+x\}$ and $C = \{(1,1,1),(0,1,1),(0,0,1)\}$ be bases for $\mathcal{P}_2$ and $\mathbb{R}^3$, respectively. Find $[g]_B^C$.

Problem 4 (S8)

Let $h\colon \mathcal{P}_2 \to \mathbb{R}^2$ be given by $h(ax^2+bx+c) = (a+2b+3c, 0)$ and let

$$B = \{x^2, 3x+1, 4x+1\}$$

and $C = \{(1,1),(1,2)\}$ be bases for $\mathcal{P}_2$ and $\mathbb{R}^2$, respectively. Find $[h]_B^C$.

Problem 5 (S8)

Let $\alpha\colon \mathbb{R}^3 \to \mathbb{R}^3$ by given by $\alpha(x,y,z) = (x+y, x-2y, x+3y)$ and let

$$B = \{(1,2,3),(0,1,2),(0,0,3)\}$$

and $C = \{(1,2,0),(1,1,0),(1,2,4)\}$ be bases for $\mathbb{R}^3$. Find $[\alpha]_B^C$.