Math113: Introduction to Linear Algebra - Homework 3

§4.1: 8, 18;
§4.2: 8, 32;
§4.3: 8, 14, 24;
§4.4: 8, 14, 30;
§4.5: 12, 14, 22;
§4.6: 4, 28.

1. Consider the polynomials

$$\boldsymbol{p}_1 = 1 + t - t^3, \ \boldsymbol{p}_2 = 2t - t^2 - t^3, \ \boldsymbol{p}_3 = 1 - t + t^2, \ \boldsymbol{p}_4 = 2 + t^2 - t^3$$

of $\mathbf{P}_3$, the vector space of polynomials of degree less or equal to 3.

(a) Find a basis for the subspace $\mathrm{Span}\{\boldsymbol{p}_1, \boldsymbol{p}_2, \boldsymbol{p}_3, \boldsymbol{p}_4\}$;

(b) Find the coordinates of $\boldsymbol{p}_1, \boldsymbol{p}_2, \boldsymbol{p}_3, \boldsymbol{p}_4$ under the basis of in (a);

(c) Extend the basis in (a) to a basis for $\mathbf{P}_3$.