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Math 110

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Let $V = \mathbf{P}_2(\mathbf{R})$ be the real vector space of polynomials of degree ≤ 2 and let V^* be the space dual to V .

Consider the following three linear functionals on V :

f_- = evaluation at -1 ;

f_0 = evaluation at 0 ;

f_+ = evaluation at $+1$.

Thus f_0 , for instance, sends a polynomial to its constant term.

Show that f_- , f_0 and f_+ form a basis of V^* .

Express the linear functional $p(x) \mapsto \int_{-1}^{+1} p(x) dx$ as a linear combination of f_- , f_0 and f_+ .