

CAAM 336 · DIFFERENTIAL EQUATIONS

Homework 32

Posted Friday 21 March 2014. Due 1pm Friday 28 March 2014.

32. [25 points]

Determine whether or not each of the following mappings is a bilinear form on the real vector space \mathcal{V} .

(a) $B(\cdot, \cdot) : \mathcal{V} \times \mathcal{V} \rightarrow \mathbb{R}$ defined by $B(u, v) = \int_0^1 u(x)v'(x) dx$ where $\mathcal{V} = C^1[0, 1]$.

(b) $B(\cdot, \cdot) : \mathcal{V} \times \mathcal{V} \rightarrow \mathbb{R}$ defined by $B(u, v) = \int_0^1 |u(x)||v(x)| dx$ where $\mathcal{V} = C[0, 1]$.

(c) $B(\cdot, \cdot) : \mathcal{V} \times \mathcal{V} \rightarrow \mathbb{R}$ defined by $B(u, v) = \int_0^1 u(x)|v(x)| dx$ where $\mathcal{V} = C[0, 1]$.

(d) $B(\cdot, \cdot) : \mathcal{V} \times \mathcal{V} \rightarrow \mathbb{R}$ defined by $B(u, v) = \int_0^1 u(x) + v(x) dx$ where $\mathcal{V} = C[0, 1]$.

(e) $B(\cdot, \cdot) : \mathcal{V} \times \mathcal{V} \rightarrow \mathbb{R}$ defined by $B(u, v) = \int_{-1}^1 xu(x)v(x) dx$ where $\mathcal{V} = C[-1, 1]$.