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

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

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

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

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