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2. Main results

The following is an example of a definition.

Definition 2.1. Let $\mathcal{X}$ be a real or complex linear space. A mapping $\|\cdot\| : \mathcal{X} \to [0,\infty)$ is called a 2-norm on $\mathcal{X}$ if it satisfies the following conditions:

(1) $\|x\| = 0 \Leftrightarrow x = 0$,
(2) $\|\lambda x\| = \|\lambda\|\|x\|$ for all $x \in \mathcal{X}$ and all scalar λ,
(3) $\|x+y\|^2 \le 2\left(\|x\|^2 + \|y\|^2\right)$ for all $x, y \in \mathcal{X}$.

Here is an example of a table.

Table 1.

1	2	3
$f(x)$	$g(x)$	$h(x)$
a	b	c

This is an example of a matrix

$$\begin{bmatrix} 1 & -2 \\ 3 & 5 \end{bmatrix} \qquad \begin{vmatrix} 5 & 2 \\ 0 & 3 \end{vmatrix} \qquad \begin{Vmatrix} 5 & 2 \\ 0 & 3 \end{Vmatrix}$$

The following is an example of an example.

Example 2.2. Let $\theta : \mathcal{A} \to \mathcal{A}$ be a homomorphism. Define $\varphi : \mathcal{A} \to \mathcal{A}$ by $\varphi(a) = a_0\theta(a)$. Then we have

$$\begin{aligned} \varphi(a_1 \dots a_n) &= a_0\theta(a_1 \dots a_n) \\ &= a_0^n\theta(a_1)\dots\theta(a_n) \\ &= a_0\theta(a_1)\dots a_0\theta(a_n) \\ &= \varphi(a_1)\dots\varphi(a_n). \end{aligned} \tag{2.1}$$

Hence φ is an n-homomorphism.

The following is an example of a theorem and a proof. Please note how to refer to a formula.

Theorem 2.3. *If* $\mathbf{B}$ *is an open ball of a real inner product space* $\mathcal{X}$ *of dimension greater than* 1, $\mathcal{Y}$ *is a real sequentially complete linear topological space, and* $f : \mathbf{B} \setminus \{0\} \to \mathcal{Y}$ *is orthogonally generalized Jensen mapping with parameters*

$s = t > \frac{1}{\sqrt{2}} r$, then there exist additive mappings $T : \mathcal{X} \to \mathcal{Y}$ and $b : \mathbb{R}_+ \to \mathcal{Y}$ such that $f(x) = T(x) + b(\|x\|^2)$ for all $x \in \mathbf{B} \setminus \{0\}$.

Proof. First note that if f is a generalized Jensen mapping with parameters $t = s \geq r$, then

$$\begin{aligned} f(\lambda(x+y)) &= \lambda f(x) + \lambda f(y) \\ &\leq \lambda(f(x) + f(y)) \\ &= f(x) + f(y) \end{aligned} \tag{2.2}$$

for some $\lambda \geq 1$ and all $x, y \in \mathbf{B} \setminus \{0\}$ such that $x \perp y$.

Step (I)- the case that f is odd: Let $x \in \mathbf{B} \setminus \{0\}$. There exists $y_0 \in \mathbf{B} \setminus \{0\}$ such that $x \perp y_0$, $x + y_0 \perp x - y_0$. We have

$$\begin{aligned} f(x) \quad &= \quad f(x) - \lambda\, f\left(\frac{x+y_0}{2\,\lambda}\right) - \lambda\, f\left(\frac{x-y_0}{2\,\lambda}\right) \\ &\quad + \lambda\, f\left(\frac{x+y_0}{2\,\lambda}\right) - \lambda^2\, f\left(\frac{x}{2\,\lambda^2}\right) - \lambda^2\, f\left(\frac{y_0}{2\,\lambda^2}\right) \\ &\quad + \lambda\, f\left(\frac{x-y_0}{2\,\lambda}\right) - \lambda^2 f\left(\frac{x}{2\,\lambda^2}\right) - \lambda^2\, f\left(\frac{-y_0}{2\,\lambda^2}\right) \\ &\quad + 2\,\lambda^2\, f\left(\frac{x}{2\,\lambda^2}\right) \\ &= \quad 2\,\lambda^2\, f\left(\frac{x}{2\,\lambda^2}\right). \end{aligned}$$

Step (II)- the case that f is even: Using the same notation and the same reasoning as in the proof of Theorem 2.3, one can show that $f(x) = f(y_0)$ and the mapping $Q : \mathcal{X} \to \mathcal{Y}$ defined by $Q(x) := (4\lambda^2)^n f((2\lambda^2)^{-n} x)$ is even orthogonally additive.

Now the result can be deduced from Steps (I) and (II) and (2.2). □

The following is an example of a remark.

Remark 2.4. One can easily conclude that g is continuous by using Theorem 2.3.

Again, note how we refer to Theorem 2.3 and formula (2.1).

Acknowledgement. Acknowledgements could be placed at the end of the text but precede the references.

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