1017-26-43 **Shoshana Abramovich*** (abramos@math.haifa.ac.il), Department of Mathematics, University of Haifa, Mt. Carmel, 31905 Haifa, Israel, and **Senka Banic** and **Marko Matic**.
Superquadratic functions in several variables.

A function $f : K_m \to \mathbb{R}$ is superquadratic if for every $x \in K_m$ there exists a vector $c(x) \in \mathbb{R}^m$ such that $f(y) \geq f(x) + < c(x), y - x > + f(|y - x|)$ holds for all $y \in K_m$ $(K_m = [0, \infty)^m)$. Superquadraticity for non negative functions is stronger than convexity unless f takes negative values. For superquadtratic functions we establish refinements of Jensen's inequality and its counterpart. Let $f : K_m \to \mathbb{R}$ be superquadratic and $f(0) = 0$. Let $p_i \in \mathbb{R}$, $p_i \geq 0$, $i = 1, ..., n$, and $P_n = \sum_{i=1}^n p_i > 0$. Define $\bar{x} = (1/P_n)\sum_{i=1}^n p_i x_i, \bar{y} = (1/P_n)\sum_{i=1}^n p_i f(x_i)$. We prove that, for any $x \in K_m$, if $c(x)$ is as above and $a, b \in K_m$ are arbitrary vectors then

$$f(a) + < c(a), \bar{x} - a > + \frac{1}{P_n}\sum_{i=1}^n p_i f(|x_i - a|) \leq \bar{y}$$

$$\leq f(b) + \frac{1}{P_n}\sum_{i=1}^n p_i < c(x_i), x_i - b > - \frac{1}{P_n}\sum_{i=1}^n p_i f(|x_i - b|).$$

Examples: 1) $f(x) = (||x||_p)^p$, $p \geq 2$ is superquadratic. 2) $f(x) = ||x||^2 ln||x||$ if $x \neq 0$, $f(0) = 0$ is superquadratic for $m = 1$ but not for $m = 2$. (Received February 05, 2006)