

Mathematical analysis 2, WNE, 2018/2019
meeting 8. – homework solutions

14 March 2019

Group 8:00

Does

$$\lim_{\substack{x \rightarrow 0 \\ y \rightarrow 0}} \frac{x^4 + y^4 - 2x^2y^2}{x + y}.$$

exist? If so calculate it.

$$\frac{x^4 + y^4 - 2x^2y^2}{x + y} = \frac{(x^2 - y^2)^2}{x + y} = \frac{(x + y)^2(x - y)^2}{x + y} = (x + y)(x - y)^2.$$

So if $x_n, y_n \rightarrow 0$ are such that $x_n + y_n \neq 0$, to

$$\frac{x_n^4 + y_n^4 - 2x_n^2y_n^2}{x_n + y_n} = (x_n + y_n)(x_n - y_n)^2 \rightarrow 0.$$

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So if $x_n, y_n \rightarrow 0$ are such that $x_n - y_n \neq 0$, to

$$\frac{x_n^4 + y_n^4 - 2x_n^2y_n^2}{x_n - y_n} = (x_n - y_n)(x_n + y_n)^2 \rightarrow 0.$$