

No calculators, cell phones, computers, notes, etc.

Circle your answer. Make your work correct, complete and coherent.

The quiz is worth 5 points. The solutions will be posted on my website later today.

Quiz 4, October 3, 2017, 1:15 class

Let $f(x,y) = -\frac{x}{\sqrt{x^2+y^2}}$.

- (a) Find the limit of $f(x,y)$ as (x,y) goes to $(0,0)$ along the y -axis with y -positive.
- (b) Find the limit of $f(x,y)$ as (x,y) goes to $(0,0)$ along the $y = x$ with y -positive.
- (c) Find the limit of $f(x,y)$ as (x,y) goes to $(0,0)$ along the x -axis with x -positive.
- (d) Find the limit of $f(x,y)$ as (x,y) goes to $(0,0)$.

ANSWER:

(a) $\lim_{\substack{(x,y) \rightarrow (0,0) \\ \text{along positive } y\text{-axis}}} -\frac{x}{\sqrt{x^2+y^2}} = \lim_{y \rightarrow 0^+} -\frac{0}{\sqrt{y^2}} = \lim_{y \rightarrow 0^+} -0 = \boxed{0}$

(b) $\lim_{\substack{(x,y) \rightarrow (0,0) \\ \text{along } y = x \text{ with } y \text{ positive}}} -\frac{x}{\sqrt{x^2+y^2}} = \lim_{y \rightarrow 0^+} -\frac{y}{\sqrt{y^2+y^2}} = \lim_{y \rightarrow 0^+} -\frac{y}{\sqrt{2}y} = \lim_{y \rightarrow 0^+} -\frac{1}{\sqrt{2}} = \boxed{-\frac{1}{\sqrt{2}}}$

(c) $\lim_{\substack{(x,y) \rightarrow (0,0) \\ \text{along the positive } x\text{-axis}}} -\frac{x}{\sqrt{x^2+y^2}} = \lim_{x \rightarrow 0^+} -\frac{x}{\sqrt{x^2}} = \lim_{x \rightarrow 0^+} -1 = \boxed{-1}$

(d) $\lim_{(x,y) \rightarrow (0,0)} -\frac{x}{\sqrt{x^2+y^2}}$ does not exist.