Lecture 10 Worksheet

June 3, 2021

Evaluate the following limits.

1. $\lim\limits_{(x,y,z)\to(1,1,-2)} \dfrac{z\ln(x)+y^2}{x+y}$
2. $\lim\limits_{(x,y)\to(4,5)} \dfrac{x+y-9}{\sqrt{x+y}-3}$
3. $\lim\limits_{(x,y)\to(0,0)} \dfrac{\cos(x^2+y^2)-1}{x^2+y^2}$
4. $\lim\limits_{(x,y)\to(0,0)} \dfrac{x^2+2y^2}{2x^2+y^2}$
5. $\lim\limits_{(x,y)\to(0,0)} \dfrac{x^2y+xy^2}{x^2+y^2}$

Determine where the following functions are discontinuous, if anywhere.

6. $f(x,y)=\begin{cases} 0 & x=0 \\ \dfrac{xy}{|x|} & \text{otherwise} \end{cases}$
7. $f(x,y,z)=\begin{cases} 0 & x=y \\ \dfrac{x^2+xz-xy-yz}{x-y} & \text{otherwise} \end{cases}$