Limits and Continuity of Multivariable Function Quiz

May 27, 2020

Questions

Q1. Given a function $f : D \to R$, $D \subseteq R^n$, we say that the limit of f (r) as r approaches a exists and has value if and only if for every real number $\epsilon > 0$ there exists a real number $\delta > 0$ such that _____ whenever _____. We then write $\lim_{\mathbf{r}\to a} f(\mathbf{r}) = L$.

a. $|f(\mathbf{r}) - L| < \epsilon$, $0 < ||\mathbf{r} - a|| < \delta$

b. $|f(\mathbf{r}) - L| > \epsilon$, $0 < ||\mathbf{r} - a|| < \delta$

c. $|f(\mathbf{r}) - L| > \epsilon$, $0 > ||\mathbf{r} - a|| > \delta$

d. $|f(\mathbf{r}) - L| < \epsilon$, $0 > ||\mathbf{r} - a|| > \delta$

Q2. What are the Sum and Difference rule for limits of multi variable function?

a. $\lim_{(x,y)\to(a,b)}[f(x;y)g(x;y)] = LM$

b. $\lim_{(x,y)\to(a,b)}[f(x;y) \pm g(x;y)] = L \pm M$

c. $\lim_{(x,y)\to(a,b)}[\frac{f(x;y)}{g(x;y)}] = \frac{L}{M}$

d. $\lim_{(x,y)\to(a,b)} f(x,y)^{\frac{r}{s}} = L^{\frac{r}{s}}$

Q3. Does $\lim_{(x,y)\to(0,0)} \frac{x^2y}{x^4+y^2}$ exists?

a. True

b. False

Q4. A function of many variables $f : D \to R$ is continuous at a point $r_0 \subseteq D \subseteq R^n$ if and only if,

a. $f(r_0) = \lim_{\mathbf{r}\to 0} f(\mathbf{r})$

b. $f(r_0) = \lim_{\mathbf{r}\to r_0} f(\mathbf{r})$

c. $f(r) = \lim_{\mathbf{r}\to r_0} f(\mathbf{r})$

Q5. Is $f(x, y) = x^3y + 3x^5y^5 - x + 2y$ continuous at $(0, 0)$?

a. True

b. False

Answer Key

Q1. $|f(\mathbf{r}) - L| < \epsilon$, $0 < ||\mathbf{r} - a|| < \delta$

Q2. $\lim_{(x,y)\to(a,b)}[f(x;y) \pm g(x;y)] = L \pm M$

Q3. False

Q4. $f(r_0) = \lim_{\mathbf{r}\to r_0} f(\mathbf{r})$

Q5. True