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MAC 2313.6717
Cyr

Quiz 5
You must show all work to receive full credit!!

Problem 1. (4 points) Given $f(x, y, z) = xy^2 e^{-xz}$, find the partial derivatives f_x, f_y, and f_z.

$$f_x = y^2 e^{-xz} - xy^2 z e^{-xz}$$

$$f_y = 2xy e^{-xz}$$

$$f_z = -x^2 y^2 e^{-xz}$$

Problem 2. (a) (1 point) Evaluate $\lim_{(x,y,z)\to(0,0,0)} \dfrac{xy + yz}{x^2 + y^2 + z^2}$ along the x-axis.

$y = z = 0$, so $\lim_{x \to 0} \dfrac{0}{x^2} = \boxed{0}$

(b) (2 points) Evaluate $\lim_{(x,y,z)\to(0,0,0)} \dfrac{xy + yz}{x^2 + y^2 + z^2}$ along the line $x = y = z$.

$\lim_{x \to 0} \dfrac{x^2 + x^2}{x^2 + x^2 + x^2} = \lim_{x \to 0} \dfrac{2x^2}{3x^2} = \lim_{x \to 0} \dfrac{2}{3} = \boxed{\dfrac{2}{3}}$

(c) (1 point) What can you conclude about $\lim_{(x,y,z)\to(0,0,0)} \dfrac{xy + yz}{x^2 + y^2 + z^2}$?

It does not exist since $0 \neq \dfrac{2}{3}$.

Problem 3. (2 points) True or false: $f_x(a, b)$ represents the slope of the tangent line to the curve $z = f(x, b)$ at the point $x = a$.

True

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