Math 21C 7PM Discussion | Quiz 8 |

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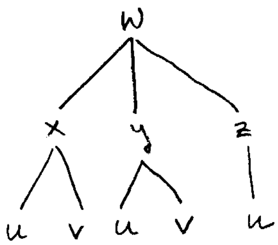
Show all work and justifications to receive full credit.
No Calculators.

1. (*5 pts*)
Let

$$w = \frac{y}{x} + ln(z), \quad x = u - 2v + 1, \quad y = 2u + v, \quad z = cos(u).$$

Find $\frac{\partial w}{\partial v}$ using Chain Rule.



$$\frac{\partial w}{\partial v} = \frac{\partial w}{\partial x}\frac{\partial x}{\partial v} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial v} + \frac{\partial w}{\partial z}\frac{\partial z}{\partial v}$$

$$= \frac{-y}{x^2}(-2) + \frac{1}{x}(1) + \frac{\partial w}{\partial z} \cdot 0$$

$$= \frac{2y}{x^2} + \frac{1}{x} = \frac{4u+2v}{(u-2v+1)^2} + \frac{1}{u-2v+1}$$

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2. (*5 pts*)
Find the derivative of the function $f(x, y) = x^3 + y^2$ at the point $(-1, 1)$ in the direction $\mathbf{A} = 3i - 4j$.

$$D_u f(-1,1) \quad \text{where} \quad u = \frac{A}{|A|} = \frac{3i - 4j}{\sqrt{3^2 + (-4)^2}} = \frac{3i - 4j}{5}$$

$$\|$$

$$\nabla f\Big|_{(-1,1)} \cdot u = \langle 3x^2, 2y \rangle\Big|_{(-1,1)} \cdot u = \frac{\langle 3, 2\rangle \cdot \langle 3, -4\rangle}{5}$$

$$= \frac{1}{5}$$

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