

Chain Rule

GROUP MEMBERS:

1. _____
2. _____
3. _____
4. _____

Goal: To learn about the Chain Rule:

$$f(x, y) = x^2 + y^2 \quad \text{and} \quad x = 3t^2 + 2, \quad y = -2t^3 - 1.$$

Find:

$$\frac{df}{dt}$$

and evaluate this derivative when $t = 1$.

Person 1: Take the formula for $f(x, y)$ and plug in the values for x and y in terms of t .

$$f(x(t), y(t)) = f(t) =$$

Person 2: Take the derivative $\frac{df}{dt}$ using the formula $f(t)$ gotten above. (Do not simplify).

Person 3: Calculate $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ using the formula for $f(x,y)$.

Person 4: Calculate $\frac{dx}{dt}$ and $\frac{dy}{dt}$ using the formulas for $x(t)$ and $y(t)$.

Person 1: Write out the express $\frac{\partial f}{\partial x} \frac{dx}{dt} + \frac{\partial f}{\partial y} \frac{dy}{dt}$ using the two formulas above. Your answer should have a mixture of x , y , and t in it. Do not simplify.

$$\frac{\partial f}{\partial x} \frac{dx}{dt} + \frac{\partial f}{\partial y} \frac{dy}{dt} =$$

Person 2: In the previous formulas, substitute $x = 3t^2+2$, $y = -2t^3 -1$ so you get a formula completely in terms of t .

$$\frac{\partial f}{\partial x} \frac{dx}{dt} + \frac{\partial f}{\partial y} \frac{dy}{dt} =$$

Group: Compare this answer and the first answer you got for $\frac{df}{dt}$.