MAD Assignment 1
Assignment 1

Ask Jensen

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Indhold

1   Problem 1

the exercise is to compute the partial derivations of the following three problems each containing a different function.

1.1   (a)

Considering the function, it is fairly straight forward to compute the derivative with respect to x and y. Both derivations will be done using the power rule: $x^n = nx^{n-1}$

$$f(x, y) = x^4 y^3 + x^5 - e^y$$

Answer:
calculating $\frac{\partial}{\partial x}$

$$f'_x = 4x^3 y^3 + 5x^4$$

calculating $\frac{\partial}{\partial y}$

$$f'_y = x^4 3y^2 - e^y$$

It is worth mentioning, that the exponent (e^y) will derive to itself even though the power function states otherwise.

1.2   (b)

This function is bit harder to compute.

$$f(x, y) = \frac{1}{\sqrt{x^3 + xy + y^2}}$$

I will start by deriving the innter function with respect to x and y since these derivations are going to be used later on in the calculations.

calculating $\frac{\partial}{\partial x}$

$$f'_x = 3x^2 + y$$

calculating $\frac{\partial}{\partial y}$

$$f'_y = x + 2y$$

Answer:
I will rewrite the function using simple fraction rules in order to make the function a bit easier to work with.

$$f(x, y) = (x^3 + xy + y^2)^{-\frac{1}{2}}$$

applying the power rule

$$f(x, y) = -\frac{1}{2}(x^3 + xy + y^2)^{-\frac{3}{2}}$$

applying the chain rule

$$f(x, y) = -\frac{1}{2}(x^3 + xy + y^2)^{-\frac{3}{2}} \cdot (3x^2 + y)$$

1.3 (c)

$$f(x, y) = \frac{x^3 + y^2}{x + y}$$

2 Problem 2

2.1 (a)

2.2 (b)

2.3 (c)

3 Problem 3

3.1 (a)

3.2 (b)

3.3 (c)

3.4 (d)

4 Problem 4