

MA 16020 LESSON 20: HIGHER ORDER PARTIAL DERIVATIVES (CALCULUS I REVIEW)

DERIVATIVES FORMULAS

- Product Rule: If $y = u(x)v(x)$, then

$$y' = u'(x)v(x) + u(x)v'(x)$$

- Quotient Rule: If $y = \frac{u(x)}{v(x)}$, then

$$y' = \frac{u'(x)v(x) - u(x)v'(x)}{v^2(x)}$$

- Chain Rule: If $y = f(g(x))$, then

$$y' = f'(g(x)) \cdot g'(x)$$

HIGHER ORDER DERIVATIVES

Recall the derivative of a function $y = f(x)$ is $y' = f'(x)$. So, the derivative of the derivative is $y'' = f''(x)$. And so on...

Exercise 1: Find the second derivative of the following:

1. $y = 9x^2 + 5y^5$

2. $y = 6x + e^{2x}$

3. $y = 10xe^{x^2}$

4. $y = xe^{5x}$

5. $y = 3x \ln(8x) + 7x^2$

6. $y = 7 \sin(x)$

7. $y = 13 \ln(x)$

8. $y = \frac{12y}{15y^3 - 1}$

9. $y = 9x \ln(8x)$

10. $y = \frac{\ln(8x)}{5y}$

11. $y = \ln(6x^2)$

12. $y = 10e^{\cos(5x-3)}$