The University of Chicago
Graham School of General Studies

Pre-MBA Mathematics
Course ID: MAMATH

Project 6: Partial Differentiation and Applications

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Read Chapter 13 and17.2.

You should pay particular attention to the definitions in chapter 13.

Taylor's Theorem states:

$$\Delta y = f(x_1) - f(x_0) \approx f'(x_0)(x_1 - x_0) + \frac{1}{2} f''(x_0)(x_1 - x_0)^2$$

or,

$$y_1 = f(x_1) \approx f(x_0) + f'(x_0)(x_1 - x_0) + \frac{1}{2} f''(x_0)(x_1 - x_0)^2$$

Do Problems 13.1: 53, 57
Do Problems 13.3: 39
Do Problems 13.4: 5
Do Problems 17.2: 1, 5, 15, 23
Do the two problems shown below:

1. Approximate the function f about the given x_0 by Taylor's Theorem with a second degree polynomial

$$f(x) = xe^x$$

Where:

$$x_0 = 0 \; and \; \Delta x = 2$$

2. A stock option position with value ,W=f(x), where x is the stock price has the associated information.

X	45	50	55
W	4	10	2
$\delta w/\delta x$ (delta)	3	-2	-5
$\delta^2 w/\delta x^2$ (gamma)	-2	-1	-3

Using Taylor's Theorem:

- If x increases from 50 to 50½ approximate the new value of W. How much is the profit or loss?
- If x decreases from 50 to 49 approximate the new value of W. How much is the profit or loss?