Calculus

Date:

Items Needed: Book

Objective: The students will find a differential, estimate the propagated error in a differential, and compare the value of the differential with the actual change in y.

Lesson:

- The equation of the tangent line at the point (c, *f*(c)) is given by $y - f(c) = f'(c)(x - c)$ which simplifies to $y = f(c) + f'(c)(x - c)$
- Look at example 1.
- When the tangent line to the graph $y = f(c) + f'(c)(x - c)$ is used as an approximation to the graph of *f* the quantity *x*-*c* is called the change in *x*, and is denoted by Δx. When Δx is small, the change in y (denoted by Δy) can be approximated as follows.
  $\Delta y = f(c + \Delta x) - f(c) \approx f'(c)\Delta x$
- Look at the definition of differentials p. 236.
- Go over example 2, p. 236.

- Scientists use estimation of errors propagated by physical measuring devices. They use the formula $f(x + \Delta x) - f(x) = \Delta y$ where $(x + \Delta x)$ is the exact value, Δx is the measurement error *f(x)* is the measured value and the difference of the two is the Propagated error.
- The relative error is determined by comparing the differential with the actual value, for example $\frac{dV}{V}$
- Do example 3 p. 237.

- Do example 4 p. 238 solving for *dy*.
- Do some problems from 11-20, p. 233 that are not assigned for homework.

- Differentials can be used to approximate function values by using the formula
  $f(x + \Delta x) \approx f(x) + dy = f(x) + f'(x)dx$
- Look at example 7, p. 239

Assignment: .4, 5, 10, 15, 18, 20, 30, 34, 41, 42, 52 (Capstone), problems 41 and 42 you need to make sure that you change degrees to radians.

Evaluation: (Could be from any one/several of the following)

Responses from classroom questions

Results of classroom sample problems
Homework responses
Check answer with Calculator
End of the section exam

Enrichment: