

*Preparing for Class 27*

Reading: Review *H-H*, Section 2.5, read Section 5.1

Problems: *H-H* Section 2.5, #1, 4, 5, 10, 11, 13, 16

**Homework Due:** Only problems assigned to prepare for Class 27 are due at the start of Class 27.

**Monday, October 30**

*Class 27:*

**Maxima, Minima and Inflection Points**

The first and second derivatives can be used to identify points where a differentiable function achieves a local maximum, a local minimum, or passes through an inflection point. One way to see this is to approximate a function near a point using its second-degree or third-degree Taylor polynomial about that point. These observations are useful in graphing and also in optimization problems.

*Preparing for Class 28*

Reading: *H-H*, Appendix E (pp. 600-603)

Problems: *H-H* Section 5.1, # 1, 5, 6, 7, 9, 15, 13

*Also solve:* Suppose  $q(x) = c_0 + c_1(x - a) + c_2(x - a)^2 + c_3(x - a)^3$ . Let  $f$  be a function for which  $f(a)$ ,  $f'(a)$ ,  $f''(a)$  and  $f^{(3)}(a)$  exist. Suppose  $q(a) = f(a)$ ,  $q'(a) = f'(a)$ ,  $q''(a) = f''(a)$  and  $q^{(3)}(a) = f^{(3)}(a)$ . Find formulas for  $c_0$ ,  $c_1$ ,  $c_2$  and  $c_3$  in terms of  $f(a)$ ,  $f'(a)$ ,  $f''(a)$  and  $f^{(3)}(a)$ .

**Wednesday, November 1**

*Class 28:*

**Finding Roots**

A value  $r$  is a *root* of a function  $g(x)$  if  $g(r) = 0$ . Root-finding problems often arise in using derivatives to find critical points (candidates for maxima and minima). Sometimes one can find roots through factoring. Often, however, it is necessary to *approximate* a root numerically. Newton's Method for approximating roots has many advantages. It is based on the Microscope Approximation,  $\Delta y \approx f'(x)\Delta x$ , using known values for  $\Delta y$  and  $f'(x)$  to estimate the  $\Delta x$  needed to improve the current estimate  $x$  of a root.

**Take-Home Quiz on Maxima, Minima and Inflection Points****Lab: Newton's Method for Approximating Roots**

*Preparing for Class 29*

Reading: *H-H*, Sections 5.3; start reading Section 5.5.

Problems: Section 5.1, # 22, 33, 34; *H-H* p.603 # 1, 2, 5, 9

**Friday, November 3**

*Class 29:*

**Optimization Problems**

We have all the tools in place now to handle interesting optimization problems involving functions of one variable. Today's class will look at a number of these.

**Take-Home Quiz Due at the Start of Class**