

Homework Assignment for Week 08

1. Section 3.9: problems 9, 11, 21, 23, 25, 33, 35, 39, 53, 55.
2. Section 3.11: problems 9, 11, 16(c,d), 17, 53, 55, 65(a,b,f(for $f(x)$ only)), 66.
3. A key point in section 3.11 is that the error of linear approximation, $f(x) - L(x)$, satisfies

$$\lim_{x \rightarrow a} \frac{f(x) - L(x)}{x - a} = 0 \quad (1)$$

provided f is differentiable at $x = a$.

The following statement gives more details about the error $f(x) - L(x)$ and will be introduced in the near future. Take this statement for granted for now:

If f is twice differentiable near $x = a$, then

$$f(x) - L(x) = \frac{1}{2}f''(c)(x - a)^2 \quad (2)$$

for some c between x and a .

Note that if the error $f(x) - L(x)$ satisfies (2) then it obviously satisfies (1). (why?)

From (2), we have an error bound

$$|f(x) - L(x)| \leq \frac{1}{2} \left(\max_{c \text{ between } x \text{ and } a} |f''(c)| \right) (x - a)^2 \quad (3)$$

Use (3) to estimate the error of linear approximation (i.e. find out $|f(x) - L(x)| \leq ???$) for problem 17 (b) of Section 3.11.

4. Chapter 3, additional and advanced problems: problems 16, 21, 22(d), 23.