

**Note:** Most of lecture 8 is in lecture 7's notes.

## 1 Secant Method (Section 3.3)

The secant method was motivated by Newton's method.

### 1.1 One-Variable Version

Recall from Newton's that

$$x_{m+1} = x_m - \frac{f(x_m)}{f'(x_m)}, \quad m \geq 0.$$

Instead, we'll approximate  $f'(x_m)$  by a difference quotient:

$$f'(x_m) \approx \frac{f(x_m) - f(x_{m-1})}{x_m - x_{m-1}}.$$

The secant method makes use of this; that is,

$$x_{m+1} = x_m - \frac{f(x_m)}{\frac{f(x_m) - f(x_{m-1})}{x_m - x_{m-1}}} = x_m - f(x_m) \frac{x_m - x_{m-1}}{f(x_m) - f(x_{m-1})}.$$

for  $m \geq 1$ .

**Remarks:**

- Method starts with  $x_0, x_1$
- Only one function call used,  $f(x_{m-1})$  stored from before.