General features of the Secant Method:

- Usually a bit slower than Newton's method. The secant method is super linearly convergent with order of convergence $\alpha = \frac{1+\sqrt{5}}{2} \approx 1.6$.. (Discussed below.)
- It requires fewer function evaluations.
- For some problems the secant method will work when Newton's method doesn't and vice versa.
- The secant method encounters the same type of difficulties as Newton's method.
  - Convergence is not guaranteed when the initial guesses are not close to the root.
  - Method may converge very slowly or not at all.
  - Requires a complex initial guess to approximate a complex root.

Since the Secant Method is super linearly convergent, then the stopping criteria $|\mathbf{p_n} - \mathbf{p_{n-1}}| < \mathbf{tol}$ is appropriate.

Example: f = cos(x)-sin(x) = 0, with tolerance = 1e-008

SECANT METHOD
guesses p_0 = 7 and p_1 = 8
In 20 iterations we have convergence:

7.000000000000000e+000
8.000000000000000e+000
7.078679742108189e+000
7.066940601553275e+000
7.068583493946478e+000
7.068583470577024e+000
7.068583470577035e+000

Note: >> 2*pi+pi/4
ans =
7.0686

NEWTON'S METHOD
with initial guess p_0 = 7

In 3 iterations we have convergence:

7.000000000000000e+000
7.068691205132266e+000
7.068583470576618e+000
7.068583470577035e+000

In this example Secant required 7 function evaluations, while Newton required 6.