\[ f(\pi) = \tan \pi \]

\[ f(\pi) = \frac{\pi + \sqrt{\pi^2 + 64\pi^2}}{8\pi} \quad (\omega_0 = \frac{\pi}{2}, \chi = \gamma = 1) \]

\[ f(\pi) = \frac{\pi}{32\pi} \quad (\omega_0 = \frac{\pi}{16}, \gamma = 1, \chi = 0) \]