Computational Physics / PHYS-UA 210 / Problem Set #7
Due October 29, 2024

You *must* label all axes of all plots, including giving the *units*!!

1. Exercise 6.16 in Newman. But first, replace ω^2 with the correct expression based on M, m, and R (it is unclear to me why this is treated as a separate independent parameter!). Then rescale the equation so it only depends on $m' = m/M$ and $r' = r/R$. Write the code to take any values of those two parameters; you will have to carefully write the initial bracketing code. Either use `jax` or an analytic derivative, and use Newton's method. Solve, with the same routine but with different inputs, the problem for values appropriate to the Moon and the Earth, the Earth and the Sun, and for the case of a Jupiter-mass planet orbiting the Sun at the distance of the Earth.

2. Implement Brent's 1D minimization method. Test it on this function: $y = (x - 0.3)^2 \exp(x)$. Compare to the `scipy.optimize.brent` implementation results.