Introduction to Computational Physics

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(Additional discussion on Friday, 23.5. and Monday, 26.5.)

EXERCISE 2.1: **Root Finding (Newton-Raphson)**
See my attached FORTRAN program: `qmwell.f`.

EXERCISE 2.2: **More Root Finding**
This is an example that one should first think before starting to do numerical computations. Substitution of $x = \pi \pm 10^{-\alpha}$, and neglecting $10^{-\alpha}$ in the first term, yields:

$$\alpha \;\approx\; (3\pi^2 + 1)\,\frac{\pi^4}{\ln 10} \;\approx\; 647.4\,,$$

which with hind-sight certainly justifies the approximation!

EXERCISE 2.3: **Stability of Root Finding (Fractals)**
See the program implementation in the CP script by U. Wolff et al.

EXERCISE 2.4:* **Still more Root Finding**
See attached Numerical Recipes programs: `rtsafe.f`, `rtsafe.c` and `rtsafe.cpp`.