Exercises

I. Polynomials

1. Evaluate the polynomial p(x) = 2x 3 5x 2 + 8 in x = 2. (hint: use *polyval*)
2. Find the roots of the polynomial p(x) = x 3 5x 2 17x+ 21. (hint: use *root*)

II. Graphs

1. Plot the functions $f: [0,1] \to \mathbb{R}, f(x) = e^{10x(x-1)} \sin 12\pi x$ and $f: [0,1] \to \mathbb{R}, f(x) = 3e^{5x^2-1} \cos 12\pi x$.
2. Plot the epicycloid $\begin{cases} x(t) = (a+b)\cos(t) - b\cos\left(\left(\frac{a}{b}+1\right)t\right) \\ y(t) = (a+b)\sin(t) - b\sin\left(\left(\frac{a}{b}+1\right)t\right) \end{cases} t \in [0, 10\pi]$, for a given a, b.
3. Plot, on a single graph, the function $f1, f2, f3 : [0, 2\pi] \to \mathbb{R}, f1(x) = \cos x ; f2(x) = \sin x ; f3(x) = \cos 2x$.
4. Plot the graph of the function $f(x) = \begin{cases} x^3 + \sqrt{1-x}; & -1 \le x \le 0 \\ x^3 - \sqrt{1-x}; & 0 < x \le 1 \end{cases}$.
5. For $x \in \{0, 1, \dots, 50\}$ plot the function $f(x) = \begin{cases} x/2 & if\ x = even \\ 3x+1 & if\ x = odd \end{cases}$.
6. Compute $g = 1 + \cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+\cfrac{1}{1+1}}}}}$

   (Consider the general case, for a given number of fractions)
7. Plot the function $g : [-2,2] \times [-4,4] \to \mathbb{R}, \ g(x,y) = e^{-\left(\left(x-\frac{1}{2}\right)^2 + (y-\frac{1}{2})^2\right)}$.

   (use : *meshgrid*, *mesh*).