

**Practice problems on Fourier series**

For the (periodic extension of) following  $f$  find their Fourier series, sine Fourier series and cosine Fourier series. For each series determine its sum.

1.  $f(t) = \begin{cases} 1, & t \in [0, 1); \\ -2, & t \in [1, 2); \end{cases}$

2.  $f(t) = \pi - t, t \in [0, \pi);$

3.  $f(t) = \begin{cases} 2t, & t \in [0, 1); \\ 2, & t \in [1, 2); \end{cases}$

4.  $f(t) = t^3, t \in [-1, 1);$

5.  $f(t) = \begin{cases} 0, & t \in [0, 1); \\ 1, & t \in [1, 2); \\ 0, & t \in [2, 3). \end{cases}$

6.  $f(t) = \begin{cases} 0, & t \in [0, 2); \\ t - 2, & t \in [2, 3); \\ 4 - t, & t \in [3, 4). \end{cases}$