

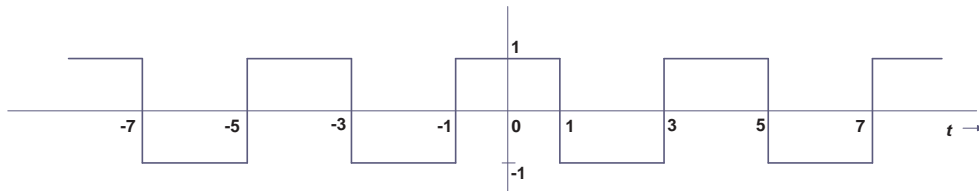
## Homework #2

Due on **Sept. 16, 2010, Thursday** in class

1. [10 points](Adapted from L&D Exercise 2.8-2) For the following periodic signal  $g(t)$ , find the coefficients  $a_0$ ,  $a_n$  and  $b_n$  in the Fourier series representation

$$g(t) = a_0 + \sum_{n=1}^{\infty} a_n \cos n2\pi f_0 t + b_n \sin n2\pi f_0 t.$$

**Hint:** (a)  $T_0 = 4$ ; (b) The integral duration can be  $[-1, 3]$ ; (c) Your answer may contain terms such as  $\sin \frac{n\pi}{2}$ ,  $\sin \frac{3n\pi}{2}$ , etc.



2. [10 points] (Adapted from L&D Exercise 2.9-1) For the following periodic signal  $g(t)$ , find the exponential Fourier series, i.e.,  $D_n$  in the exponential Fourier series representation

$$g(t) = \sum_{n=-\infty}^{\infty} D_n e^{jn2\pi f_0 t}.$$

Also find the amplitude and phase of  $D_n$ .

**Hint:** (a) In the duration  $0 \leq t \leq 2\pi$ ,  $g(t) = \frac{1}{2\pi}t$ ; (b) Separately evaluate  $D_0$  and  $D_n$  (with  $n \neq 0$ ); (c) You may want to use  $\int t e^{at} dt = \frac{e^{at}}{a^2}(at - 1)$ .

