COMMUNICATION SYSTEMS

HOMEWORK # 1:

Please work out the **ten** (10) problems stated below – LD refers to the text: B,P. Lathi and Z. Ding, *Modern Digital and Analog Communication Systems* (Fourth Edition), Oxford University Press, Oxford (UK), 2009. Exercise **2.1-1** (LD) refers to Exercise 1 for Section 2.1 of LD.

Show work and **explain** reasoning. Three (3) problems, selected at random amongst these ten problems, will be marked.

1. _____
Problem **2.1-2** (LD).

2. _____
Problem **2.1-3** (LD).

3. _____
Problems **2.2-1** and **2.2-2** (LD).

4. _____
Problem **2.3-4** (LD).

5. _____
Problem **2.4-1** (LD).

6. _____
Problem **2.5-5** (LD).

7. _____
Problem **2.8-4** (LD).

8. _____
Problem **2.9-1** (LD).

9. _____
Problem **2.9-3** (LD).

10.

A signal $g : \mathbb{R} \to \mathbb{R}$ is of the form

$$g(t) = \cos(2\pi t) + \sin(6\pi t), \quad t \in \mathbb{R}.$$

Can you find its Fourier series expansion without doing any computations? Explain. Generalize to the signal

$$g(t) = \sum_{k=0}^{K} a_k \cos(2\pi k f t) + \sum_{k=1}^{K} a_k \sin(2\pi k f t), \quad t \in \mathbb{R}$$

with $f > 0$, positive integer K and scalars $a_0, \ldots, a_K, b_1, \ldots, b_K$.