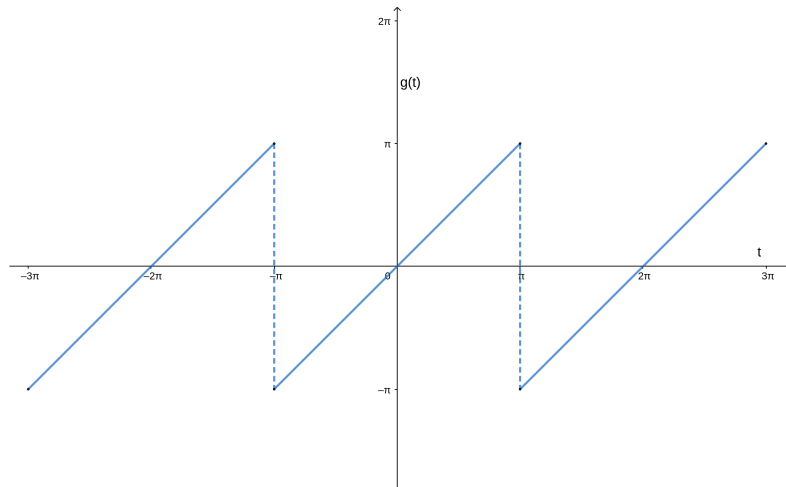**Student 1 Roll No.**_____

Evaluator 1 Roll No._____

Student 2 Roll No._____

Evaluator 2 Roll No._____

Problem 1 (20 Marks)
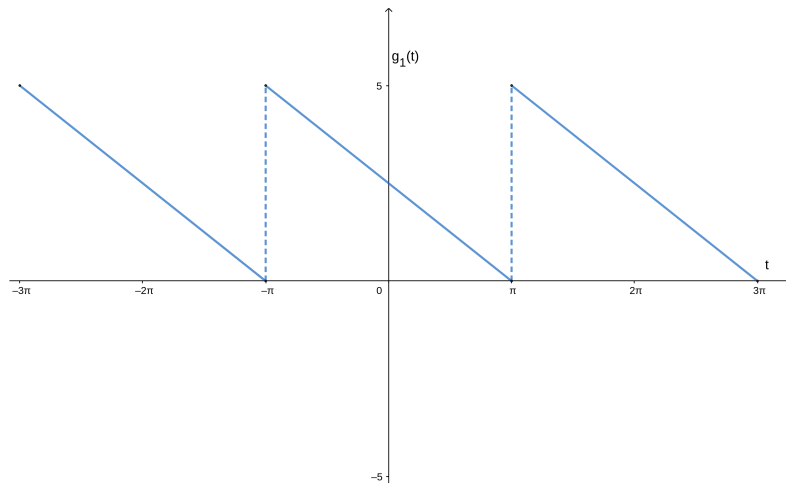
Consider the graph in the following figure:

Periodic Function $g(t)$

The fourier series of $g(t)$ is given by:

$$g(t) = \sum_{n=1}^{\infty} \frac{2}{n}(-1)^{n+1} \sin(nt)$$

Find the fourier series of the function $g_1(t)$ given in the following figure:

Periodic Function $g_1(t)$

Problem 2 (20 Marks)

Solve the following differential equation using the method of undetermined coefficients:

$$y'' - 4y' - 12y = 2t^2 - t + 3$$

Problem 3 (20 Marks)

Find a general solution to the following equation using the variation of parameter method:

$$y'' - 2y' + y = \frac{e^t}{t^2 + 1}$$

Problem 4 (20 Marks)

Find a general solution to the following equation:

$$t^2 y'' - ty' + y = \frac{t}{(ln(t))^2 + 1}$$