

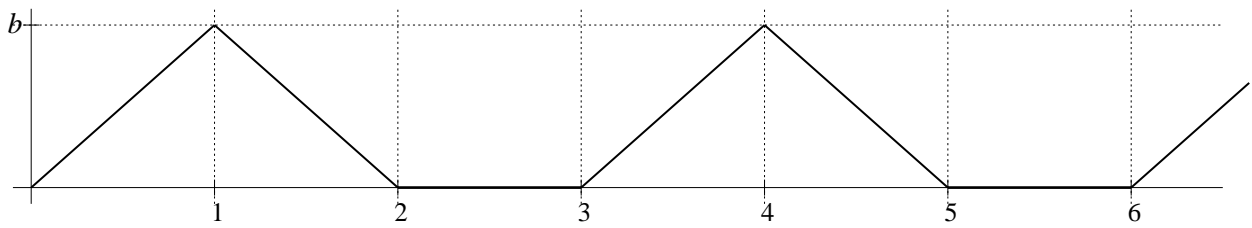
Math 274 Homework

Sections: 7.7,7.8,7.9

Due: 31 May 2018

Name: _____
Point Values in boxes.

1. 2 For $b > 0$, a graph of $y = f(t)$ is given below.



Compute the Laplace transform of $f(t)$.

2. Assume $g(t)$ is piecewise continuous and of exponential order and consider the initial value problem

$$y' - 2y = g(t), \quad y(0) = 3.$$

- (a) 1 Find the solution. Express your solution in terms of a convolution.

- (b) 2 If $g(t) = 2t + 3$, find the solution by evaluating the convolution integral you found in (a).

3. 2 Assume $g(t)$ is piecewise continuous and of exponential order and consider the initial value problem

$$y'' - y = g(t), \quad y(0) = 0, y'(0) = 2.$$

Find the solution. Express your solution in terms of a convolution.

4. Consider a mass-spring system sitting in front of a cuckoo clock. After π seconds the time is exactly 1 pm. The cuckoo comes out of the clock and strikes the system exerting an impulse on the mass. The system is governed by the symbolic initial value problem

$$x'' + 4x = 2\delta(t - \pi), \quad x(0) = 0, x'(0) = -2, \quad (1)$$

where $x(t)$ measures the displacement from the equilibrium.

- (a) 2 Determine $x(t)$, i.e. solve the symbolic initial value problem (1).

- (b) 1 Carefully sketch a graph of $x(t)$ for $t \in [0, 2\pi]$.

[HINT: sine is periodic.]

