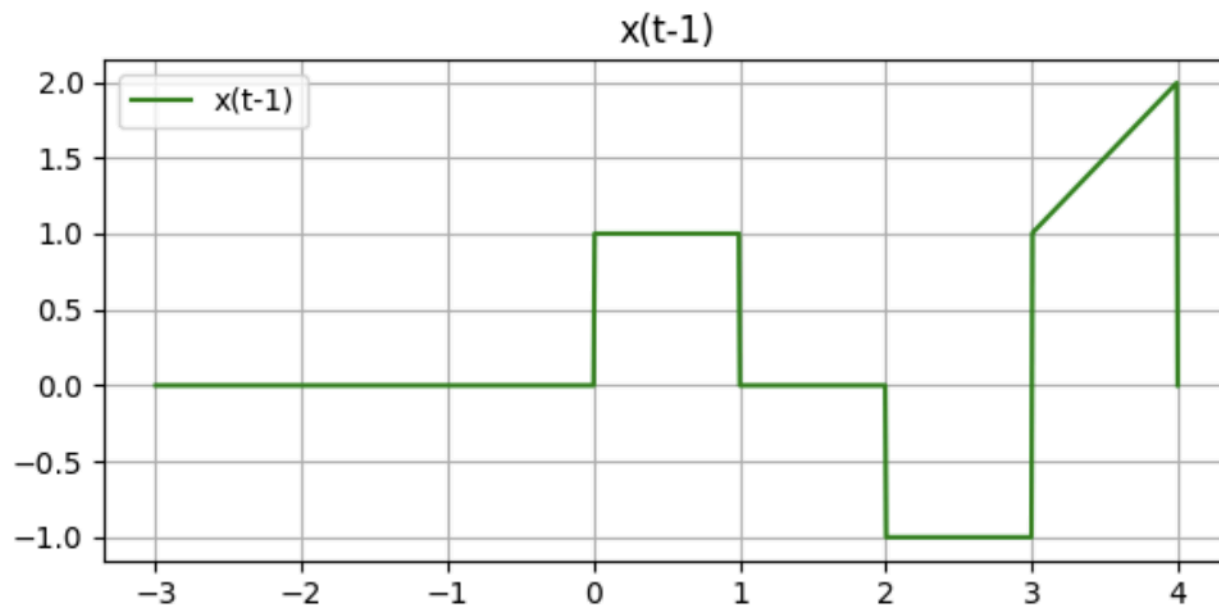
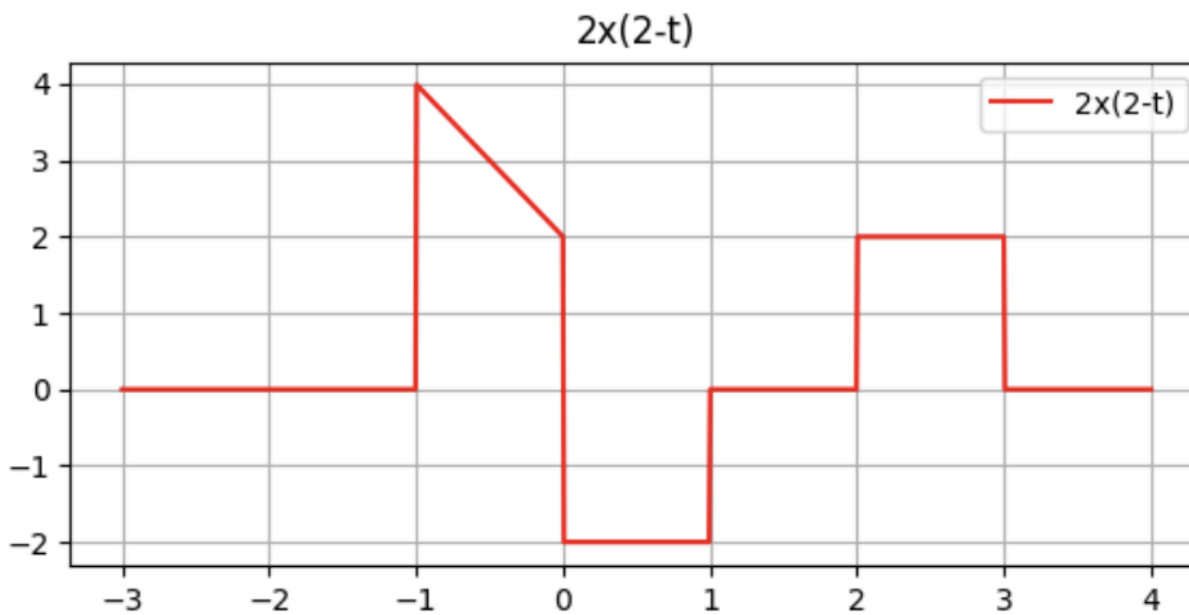


1)

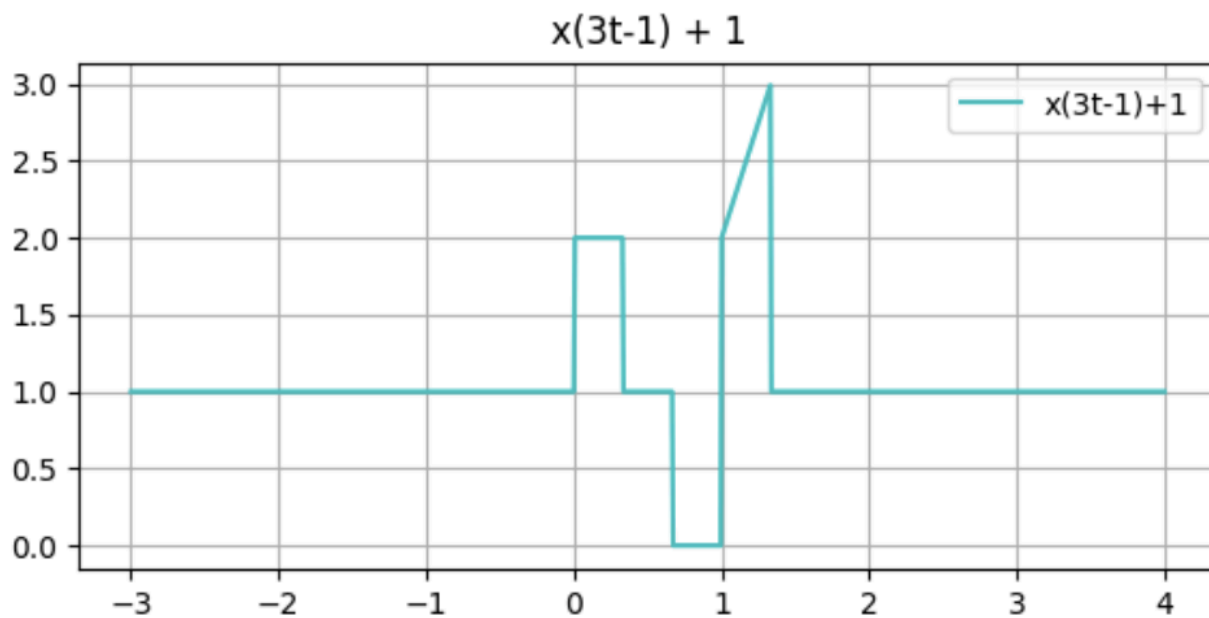
a) $x(t - 1)$



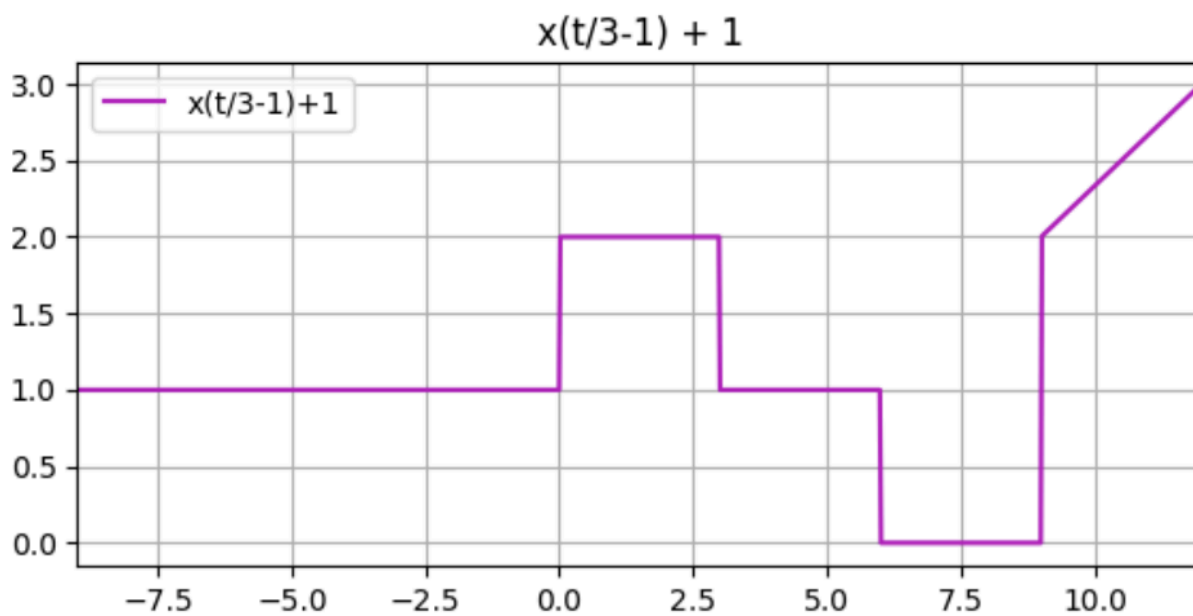
b) $2x(2 - t)$



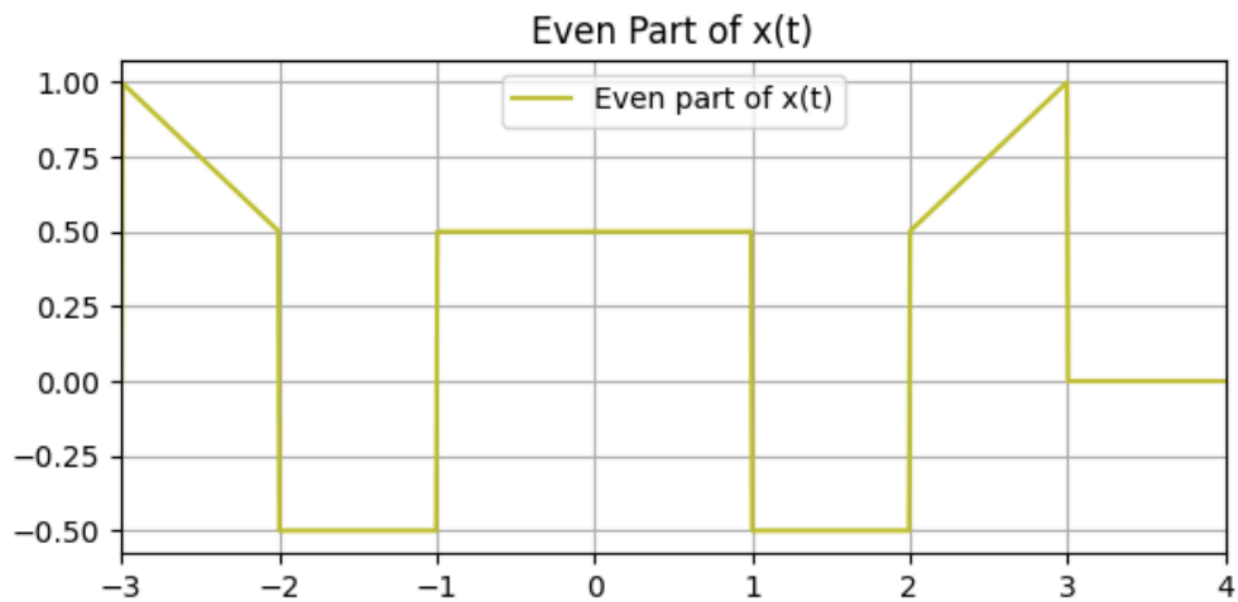
c) $x(3t - 1) + 1$



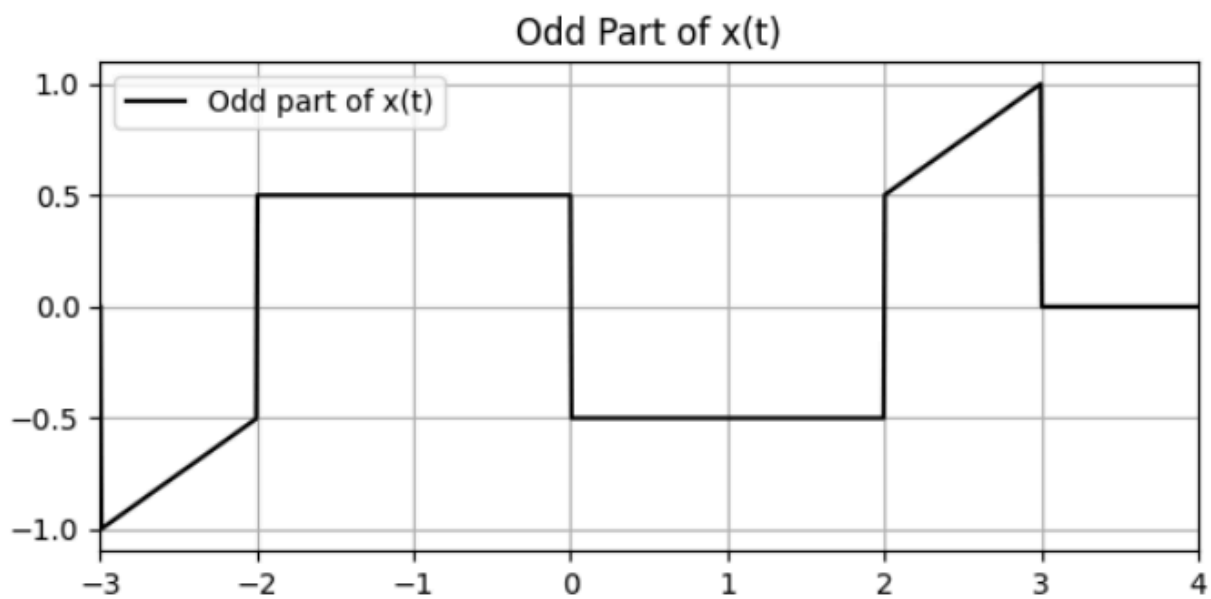
d) $x(t/3 - 1) + 1$



e) Even part of $x(t)$



f) Odd part of $x(t)$



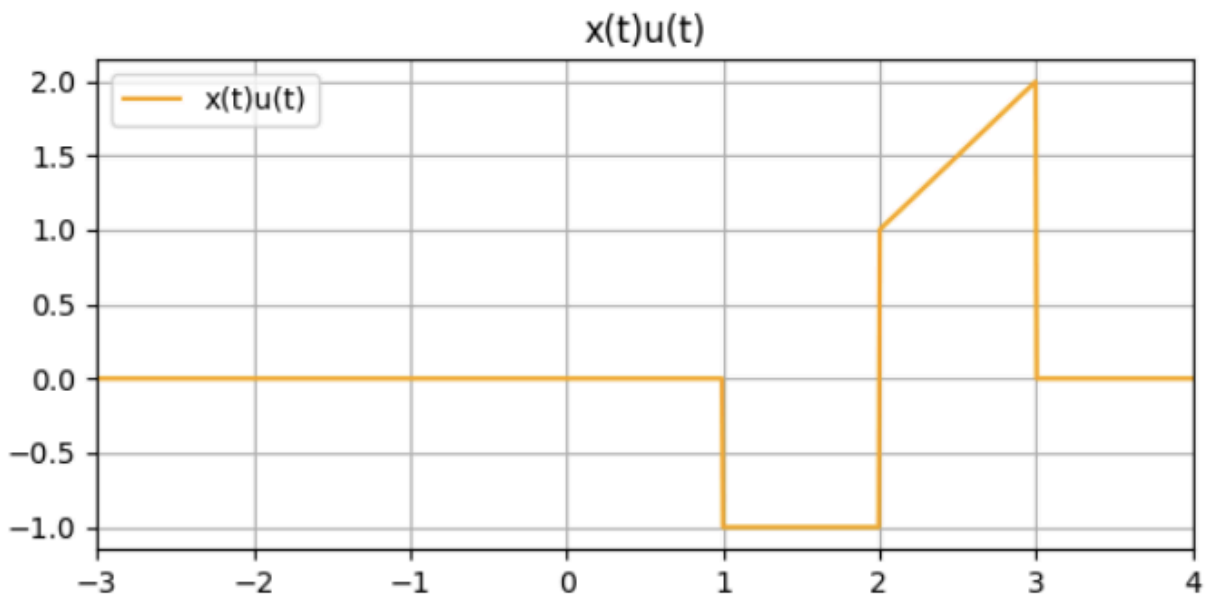
ECE 45 WI25 Professor Heath

January 16, 2025 11:59PM

Andrew Onozuka A16760043

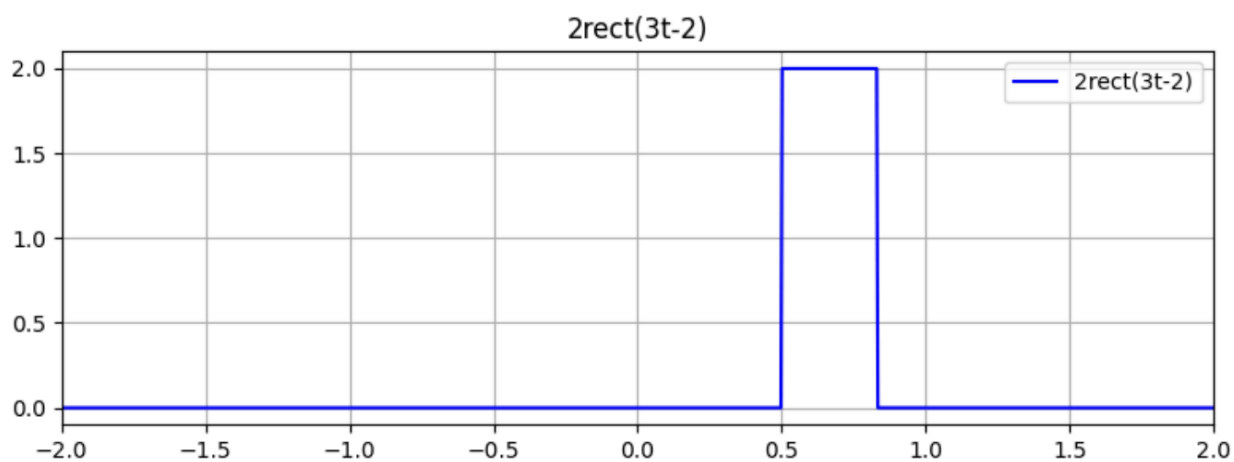
Homework #2

g) $x(t)u(t)$

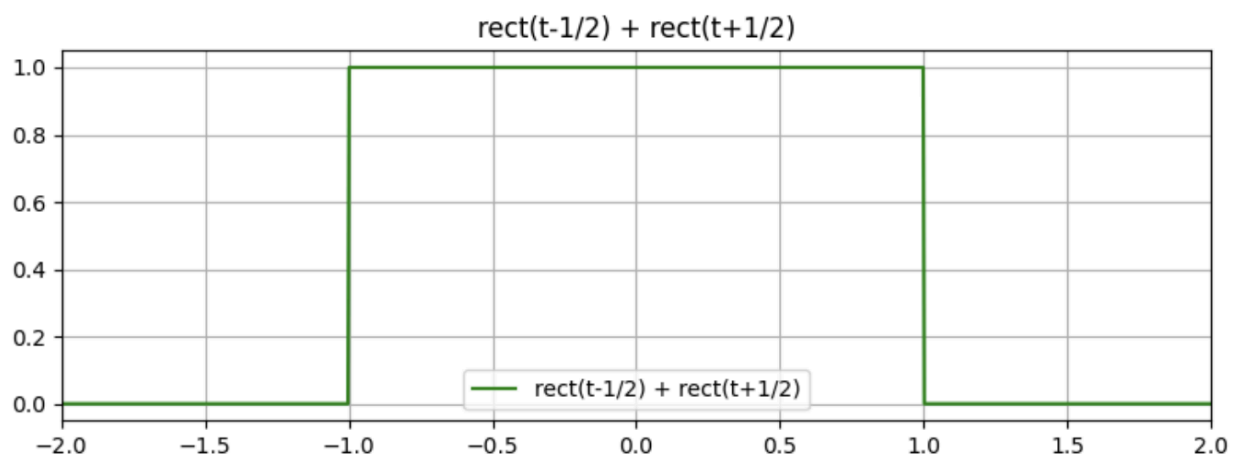


2)

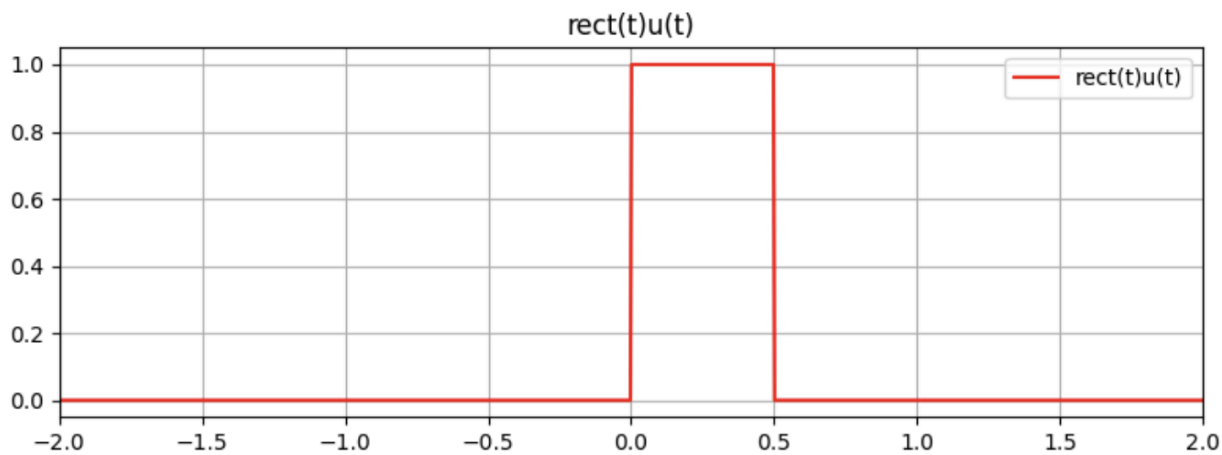
a) $2\text{rect}(3t - 2)$



b) $\text{rect}(t - 1/2) + \text{rect}(t + 1/2)$



c) $\text{rect}(t)u(t)$



3)

a) $V_S = A \angle 0$

b) $V_L = Z_E V_S$

$$V_{total} = R + j\omega L - \frac{j}{\omega C}$$

$$V_L = I * Z_L$$

$$V_L = \frac{V_S}{Z_{total}} * j\omega L$$

$$V_E = \frac{V_L}{V_S} = \frac{j\omega L}{Z_{total}}$$

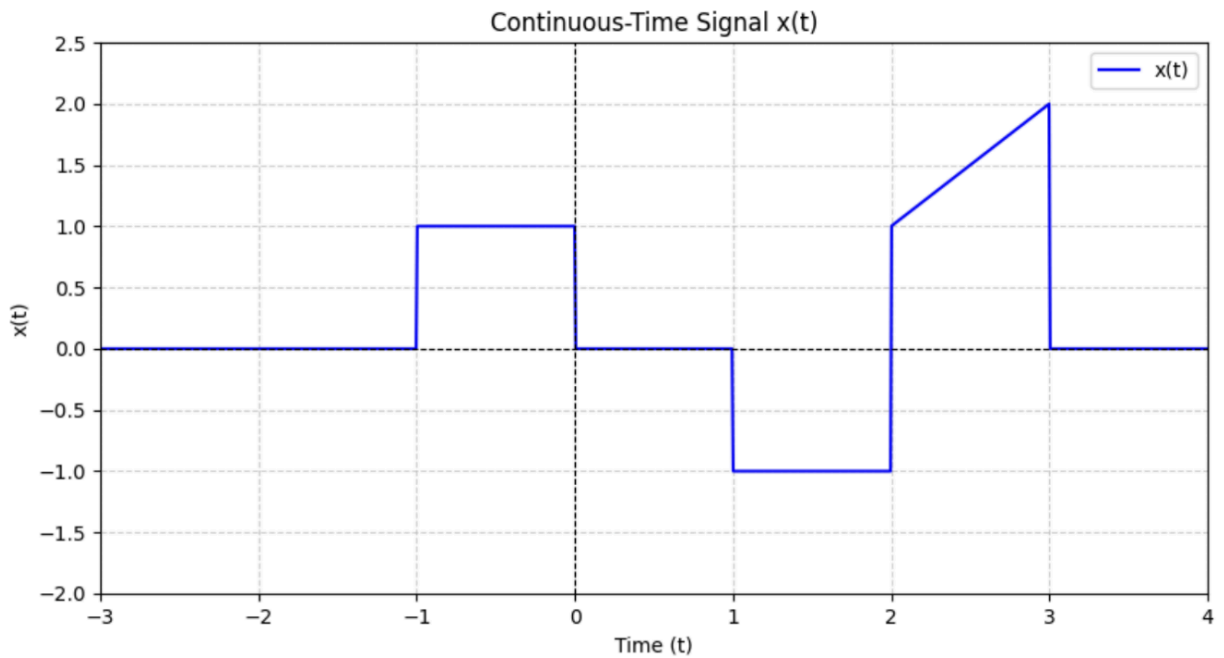
c) $V_L = (R + j(\omega L - \frac{1}{\omega C}))A \angle 0$

d) $|Z_E| = \sqrt{R^2 + (\omega L - \frac{1}{\omega C})^2}$

e) $\theta_{Z_E} = \tan^{-1}(\frac{\omega L - \frac{1}{\omega C}}{R})$

f) $v_L(t) = A|Z_E|\cos(\omega t + \theta_{Z_E})$

4) MATLAB script - MATLAB was down so I made my own python notebook instead



ECE 45 WI25 Professor Heath

January 16, 2025 11:59PM

Andrew Onozuka A16760043

Homework #2

- 5) MATLAB live script - MATLAB was down so I included what should be the correct code (modified from the python notebook code I made to generate all of the plots above)

```
hw2_ece_45_w25_v1
1 % hw2_ece_45_w25_v1.m
2 %
3 % Script to produce the required outputs for the most amazing course in the
4 % ECE curriculum worldwide, ECE 45
5 %
6 % Created by Student Y Y
7 %
8 % Change history
9 %   January 8, 2025 - initial version
10 %
11 % Pending items to finish
12 %   N/A
13 %
14 %
15 %% Problem 1
16
17 % Use this template below to do some plotting
18
19 t = linspace(-3, 4, 500); % Time vector for plotting
20 ct_fun = ct_function(t);
21
22 % (a) x(t-1)
23 figure(1001)
24 x_a = ct_function(t - 1);
25 plot(t, x_a, 'LineWidth', 3);
26 xlabel('t'); ylabel('x(t-1)');
27 title('(a) x(t-1)');
28 grid on; set(gca, 'FontSize', 14);
29
30 % (b) 2x(2-t)
31 figure(1002)
32 x_b = 2 * ct_function(2 - t);
33 plot(t, x_b, 'LineWidth', 3);
34 xlabel('t'); ylabel('2x(2-t)');
35 title('(b) 2x(2-t)');
36 grid on; set(gca, 'FontSize', 14);
37
38 % (c) x(3t-1) + 1
39 figure(1003)
40 x_c = ct_function(3 * t - 1) + 1;
41 plot(t, x_c, 'LineWidth', 3);
42 xlabel('t'); ylabel('x(3t-1) + 1');
43 title('(c) x(3t-1) + 1');
44 grid on; set(gca, 'FontSize', 14);
45
46 % (d) x(t/3-1) + 1
47 figure(1004)
48 x_d = ct_function(t / 3 - 1) + 1;
49 plot(t, x_d, 'LineWidth', 3);
50 xlabel('t'); ylabel('x(t/3-1) + 1');
51 title('(d) x(t/3-1) + 1');
52 grid on; set(gca, 'FontSize', 14);
```

```
hw2_ece_45_w25_v1 | No Selection
53
54 % (e) Even part of x(t)
55 figure(1005)
56 x_even = (ct_function(t) + ct_function(-t)) / 2;
57 plot(t, x_even, 'LineWidth', 3);
58 xlabel('t'); ylabel('Even part of x(t)');
59 title('(e) Even Part of x(t)');
60 grid on; set(gca, 'FontSize', 14);
61
62 % (f) Odd part of x(t)
63 figure(1006)
64 x_odd = (ct_function(t) - ct_function(-t)) / 2;
65 plot(t, x_odd, 'LineWidth', 3);
66 xlabel('t'); ylabel('Odd part of x(t)');
67 title('(f) Odd Part of x(t)');
68 grid on; set(gca, 'FontSize', 14);
69
70 % (g) x(t)u(t)
71 figure(1007)
72 u_t = t >= 0; % Unit step function
73 x_g = ct_function(t) .* u_t;
74 plot(t, x_g, 'LineWidth', 3);
75 xlabel('t'); ylabel('x(t)u(t)');
76 title('(g) x(t)u(t)');
77 grid on; set(gca, 'FontSize', 14);
78
79
80 %% Put my functions here
81 function my_ct_fun = ct_function(t)
82 % Function to compute x(t) based on defined piecewise intervals
83 my_ct_fun = zeros(size(t)); % Preallocate for efficiency
84 for c = 1:length(t)
85     switch true % Use switch to handle intervals
86         case t(c) < -1
87             my_ct_fun(c) = 0;
88         case t(c) >= -1 && t(c) < 0
89             my_ct_fun(c) = 1;
90         case t(c) >= 0 && t(c) < 1
91             my_ct_fun(c) = 0;
92         case t(c) >= 1 && t(c) < 2
93             my_ct_fun(c) = -1;
94         case t(c) >= 2 && t(c) < 3
95             my_ct_fun(c) = t(c) - 1;
96         case t(c) >= 3
97             my_ct_fun(c) = 0;
98     end
99 end
100 end
101
```

ECE 45 WI25 Professor Heath

January 16, 2025 11:59PM

Andrew Onozuka A16760043

Homework #2

6) Previous HW

HW1

● Graded

■ Select each question to review feedback and grading details.

Student

Andrew Onozuka

Total Points

100 / 100 pts

Question 1

[Q1](#)

40 / 40 pts

Question 2

[Q2](#)

40 / 40 pts

Question 3

[Q3](#)

10 / 10 pts

Question 4

[Q4](#)

10 / 10 pts