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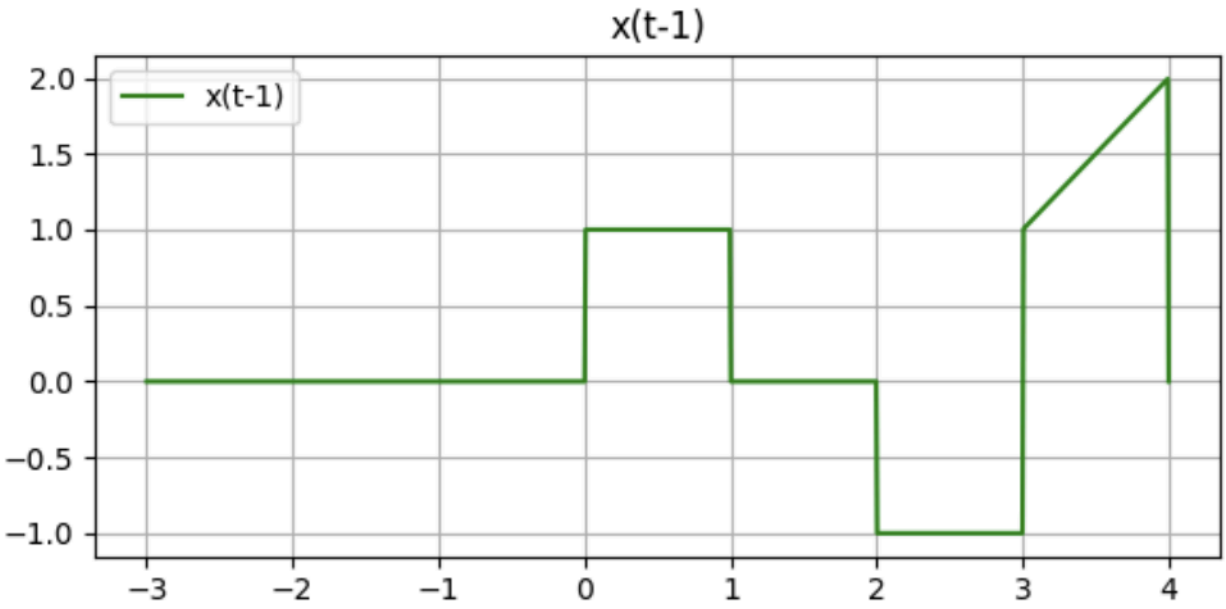
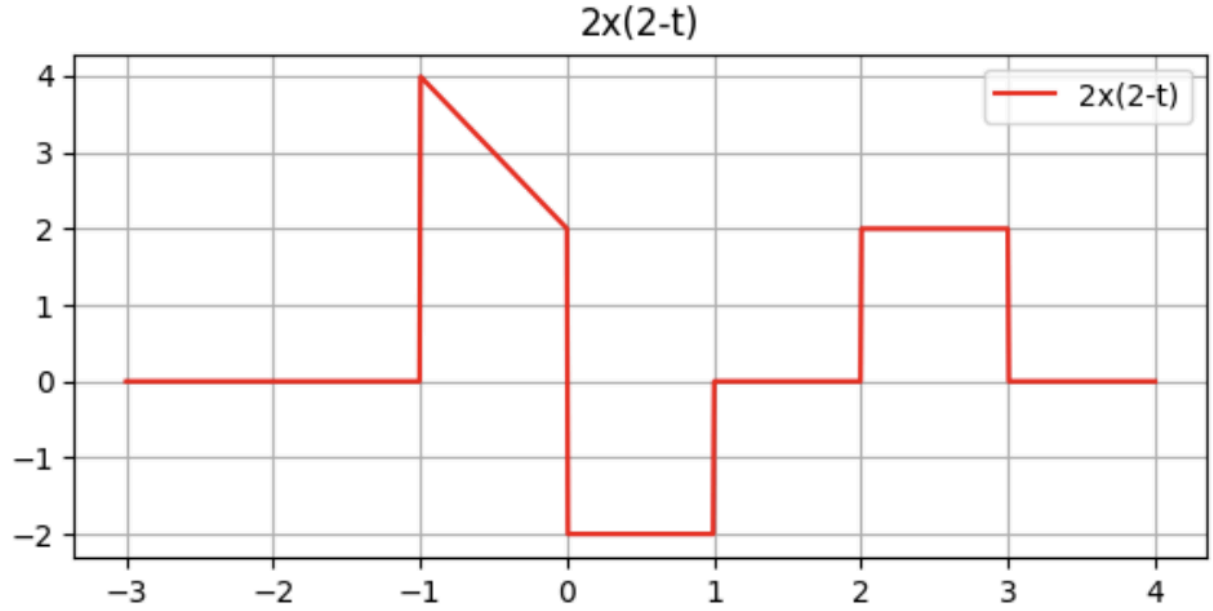
1)

a) $x(t-1)$



b) $2x(2-t)$



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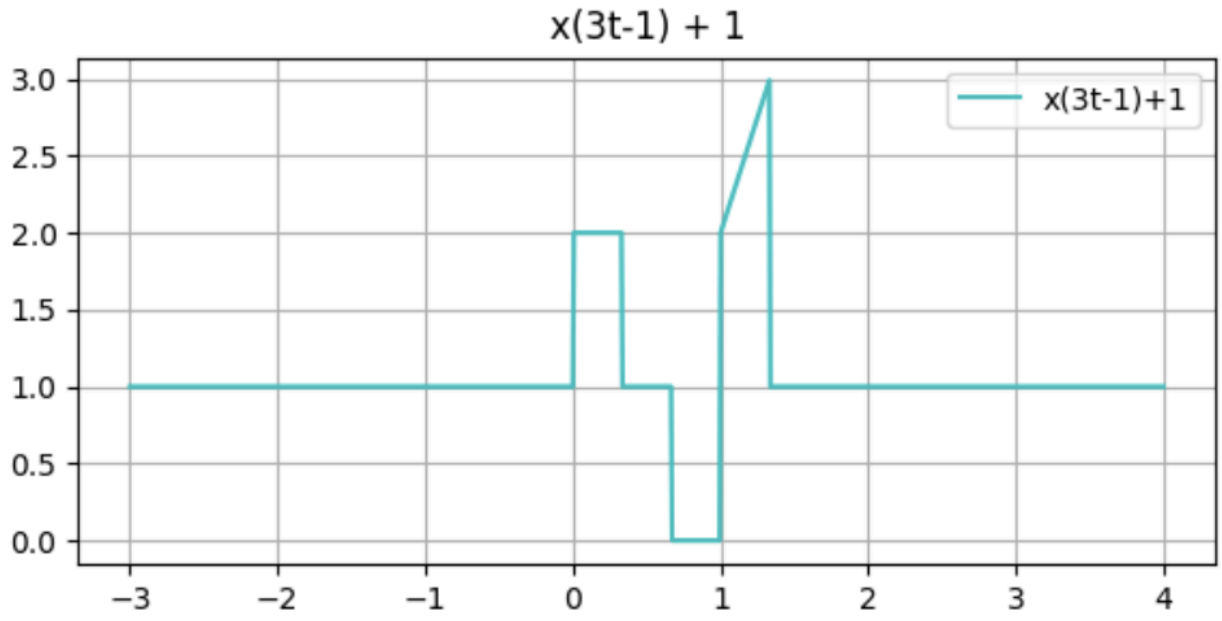
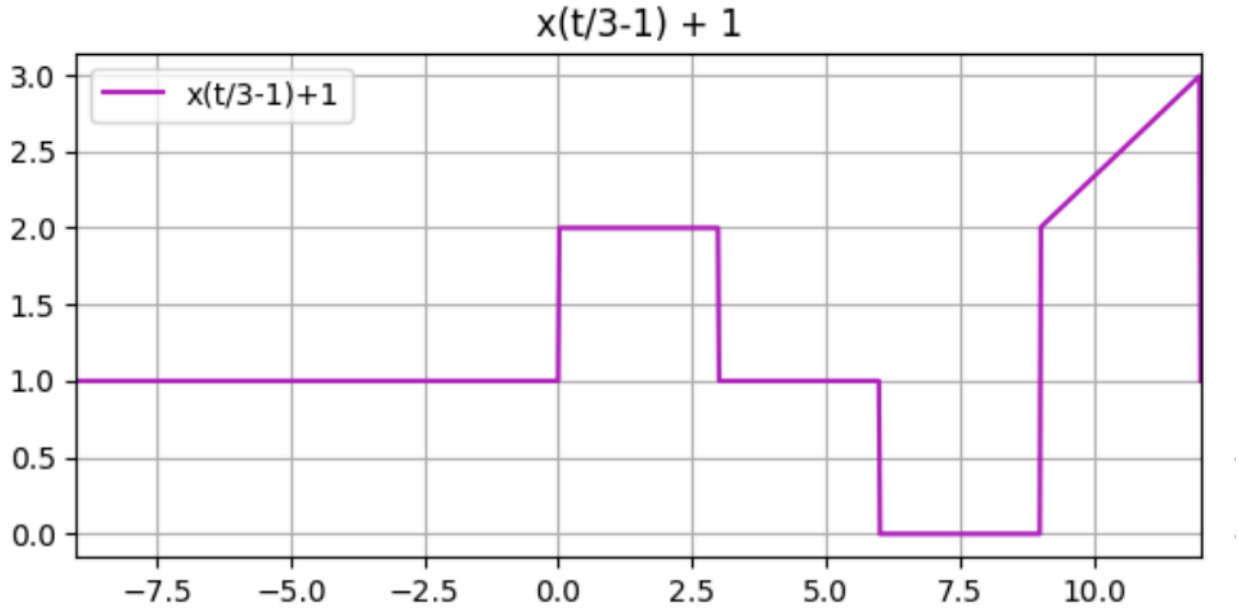
c) $x(3t - 1) + 1$



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



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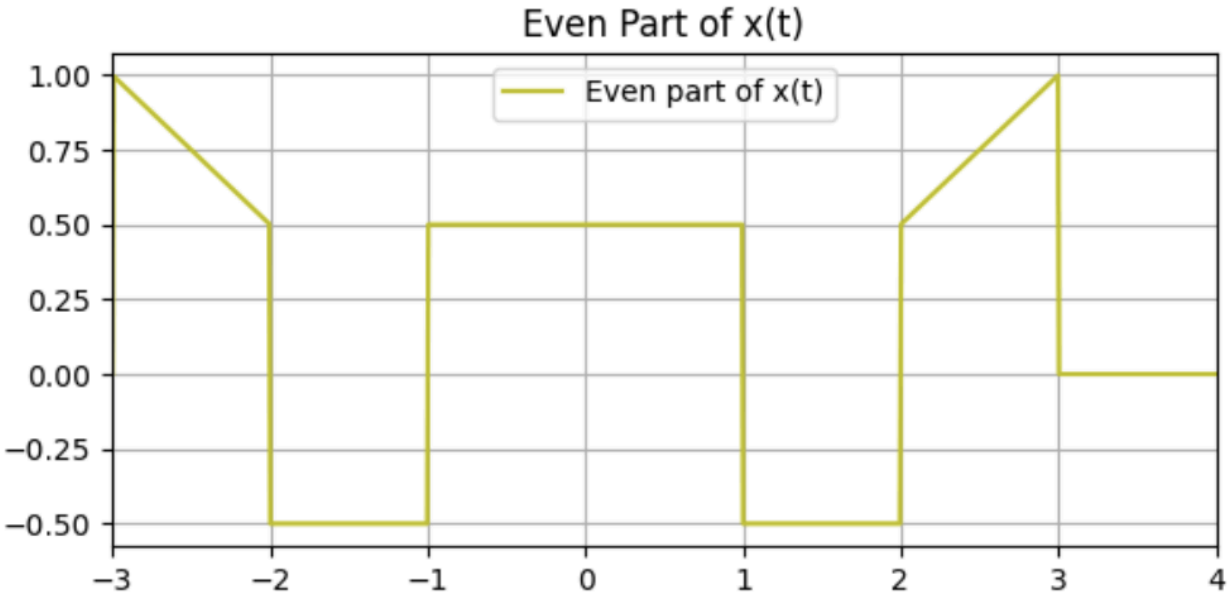
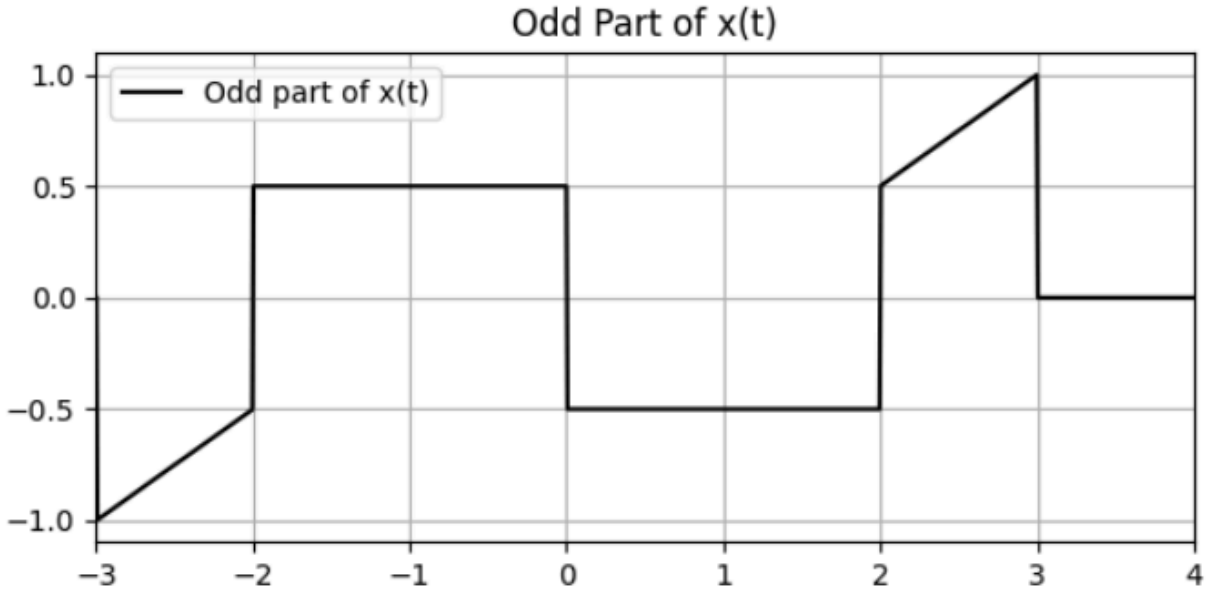
e) Even part of $x(t)$



f) Odd part of $x(t)$



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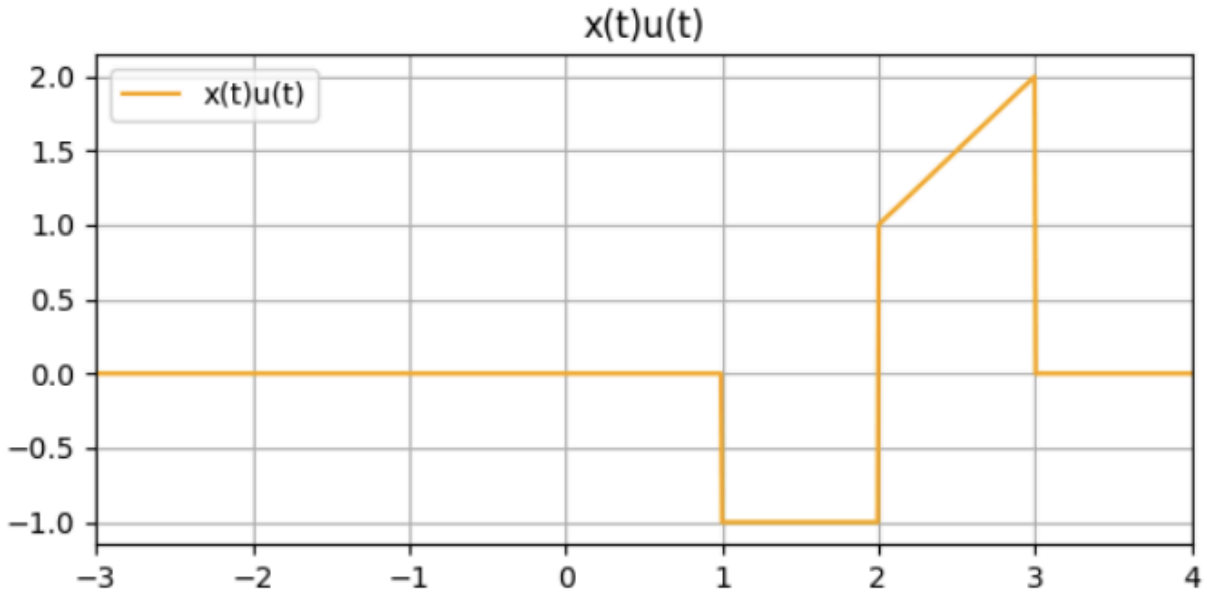
g) $x(t)u(t)$



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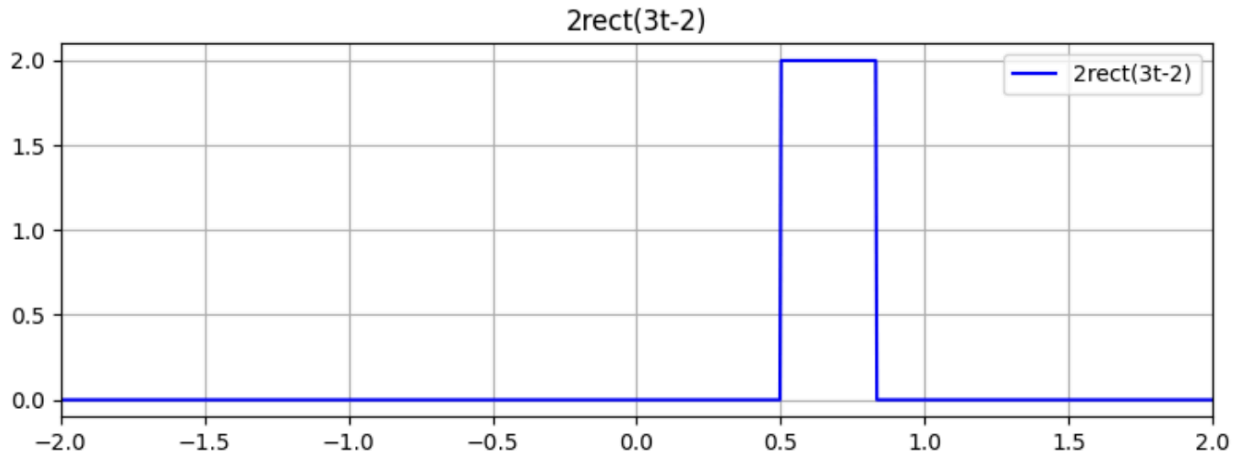
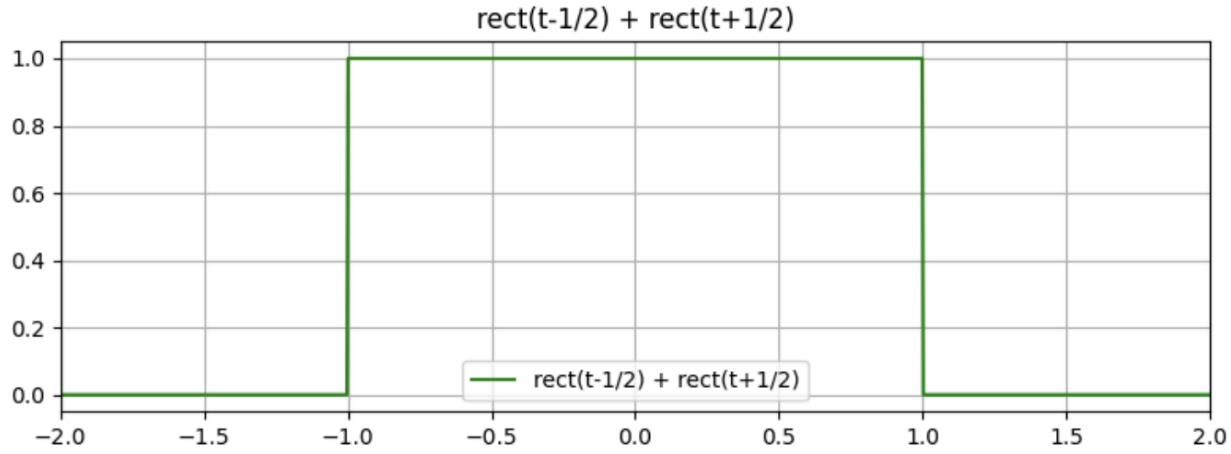
2)

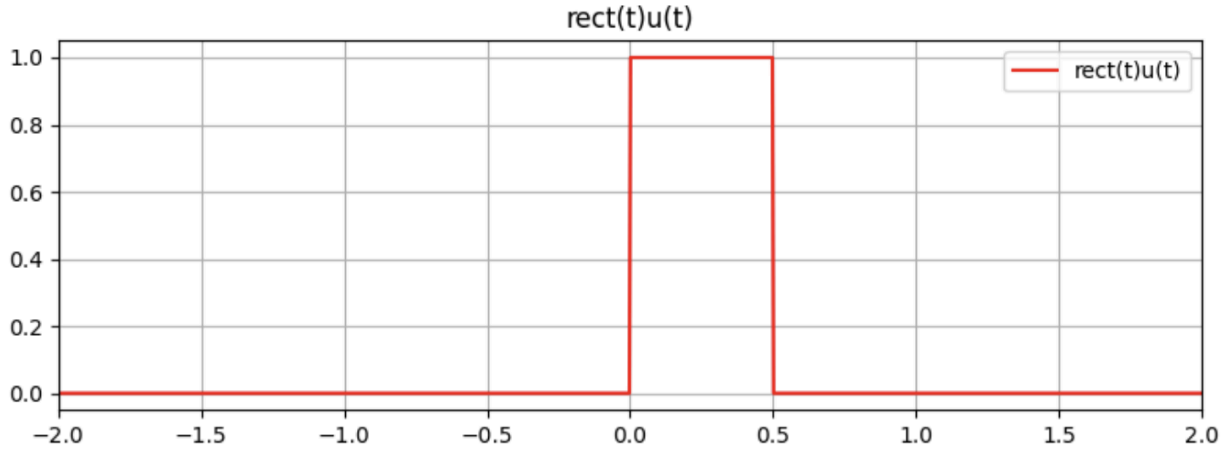
a) $2\text{rect}(3t - 2)$



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



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



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3)

a) $V_S = A\angle 0$

b) $V_L = Z_E V_S$

$V_{total} = R + jwL - \frac{j}{wC}$

$V_L = I * Z_L$

$V_L = \frac{V_S}{Z_{total}} * jwL$

$V_E = \frac{V_L}{V_S} = \frac{jwL}{Z_{total}}$

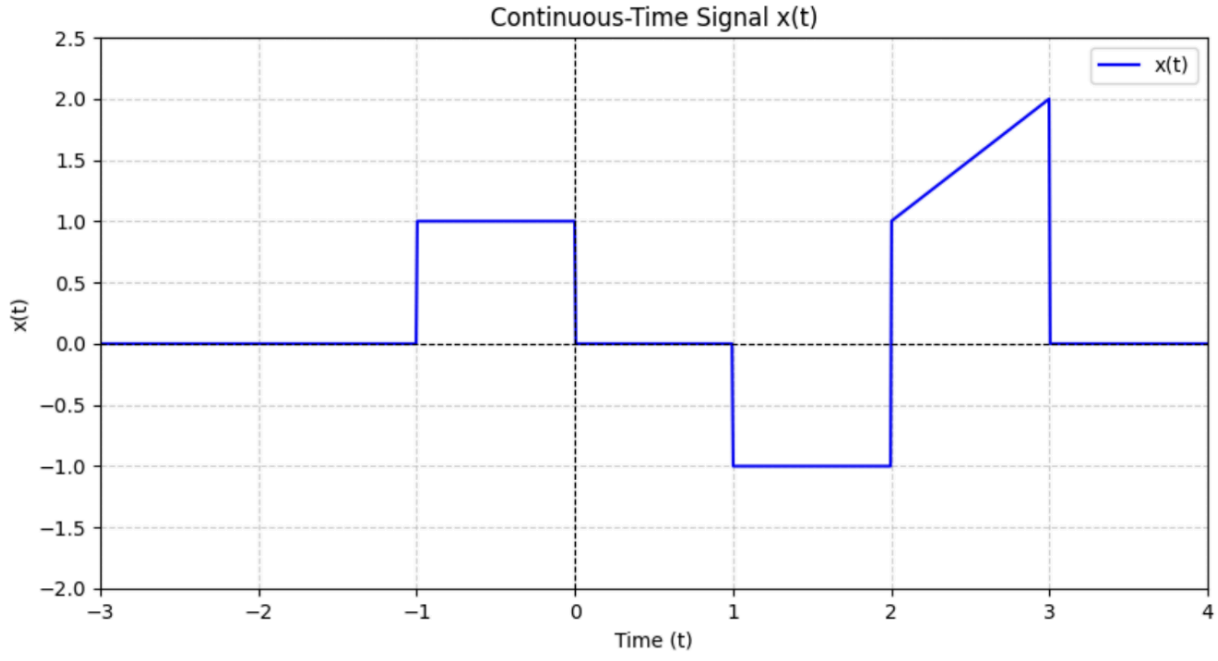
c) $V_L = (R + j(wL - \frac{1}{wC}))A\angle 0$

d) $|Z_E| = \sqrt{R^2 + (wL - \frac{1}{wC})^2}$

e) $\theta_{Z_E} = tan^{-1}(\frac{wL - \frac{1}{wC}}{R})$

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

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



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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)

```m
% hw2_ece_45_w25_v1.m
%
% Script to produce the required outputs for the most amazing course in the
% ECE curriculum worldwide, ECE 45
%
% Created by Student Y Y
%
% Change history
%   January 8, 2025 - initial version
%
% Pending items to finish
%   N/A
%

%% Problem 1

% Use this template below to do some plotting

t = linspace(-3, 4, 500); % Time vector for plotting
ct_fun = ct_function(t);

% (a) x(t-1)
figure(1001)
x_a = ct_function(t - 1);
plot(t, x_a, 'LineWidth', 3);
xlabel('t'); ylabel('x(t-1)');
title('(a) x(t-1)');
grid on; set(gca, 'FontSize', 14);

% (b) 2x(2-t)
figure(1002)
x_b = 2 * ct_function(2 - t);
plot(t, x_b, 'LineWidth', 3);
xlabel('t'); ylabel('2x(2-t)');
title('(b) 2x(2-t)');
grid on; set(gca, 'FontSize', 14);

% (c) x(3t-1) + 1
figure(1003)
x_c = ct_function(3 * t - 1) + 1;
plot(t, x_c, 'LineWidth', 3);
xlabel('t'); ylabel('x(3t-1) + 1');
title('(c) x(3t-1) + 1');
grid on; set(gca, 'FontSize', 14);

% (d) x(t/3-1) + 1
figure(1004)
x_d = ct_function(t / 3 - 1) + 1;
plot(t, x_d, 'LineWidth', 3);
xlabel('t'); ylabel('x(t/3-1) + 1');
title('(d) x(t/3-1) + 1');
grid on; set(gca, 'FontSize', 14);

% (e) Even part of x(t)
figure(1005)
x_even = (ct_function(t) + ct_function(-t)) / 2;
plot(t, x_even, 'LineWidth', 3);
xlabel('t'); ylabel('Even part of x(t)');
title('(e) Even Part of x(t)');
grid on; set(gca, 'FontSize', 14);

% (f) Odd part of x(t)
figure(1006)
x_odd = (ct_function(t) - ct_function(-t)) / 2;
plot(t, x_odd, 'LineWidth', 3);
xlabel('t'); ylabel('Odd part of x(t)');
title('(f) Odd Part of x(t)');
grid on; set(gca, 'FontSize', 14);

% (g) x(t)u(t)
figure(1007)
u_t = t >= 0; % Unit step function
x_g = ct_function(t) .* u_t;
plot(t, x_g, 'LineWidth', 3);
xlabel('t'); ylabel('x(t)u(t)');
title('(g) x(t)u(t)');
grid on; set(gca, 'FontSize', 14);


%% Put my functions here
function my_ct_fun = ct_function(t)
% Function to compute x(t) based on defined piecewise intervals
    my_ct_fun = zeros(size(t)); % Preallocate for efficiency
    for c = 1:length(t)
        switch true % Use switch to handle intervals
            case t(c) < -1
                my_ct_fun(c) = 0;
            case t(c) >= -1 && t(c) < 0
                my_ct_fun(c) = 1;
            case t(c) >= 0 && t(c) < 1
                my_ct_fun(c) = 0;
            case t(c) >= 1 && t(c) < 2
                my_ct_fun(c) = -1;
            case t(c) >= 2 && t(c) < 3
                my_ct_fun(c) = t(c) - 1;
            case t(c) >= 3
                my_ct_fun(c) = 0;
        end
    end
end
```

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6) Previous HW