

---

```
% Zidane Karim 2-14-2026 ECE211
% 4c
```

## figure 1

```
f0 = 1000; % hz
sample_rate = 5000; % hz

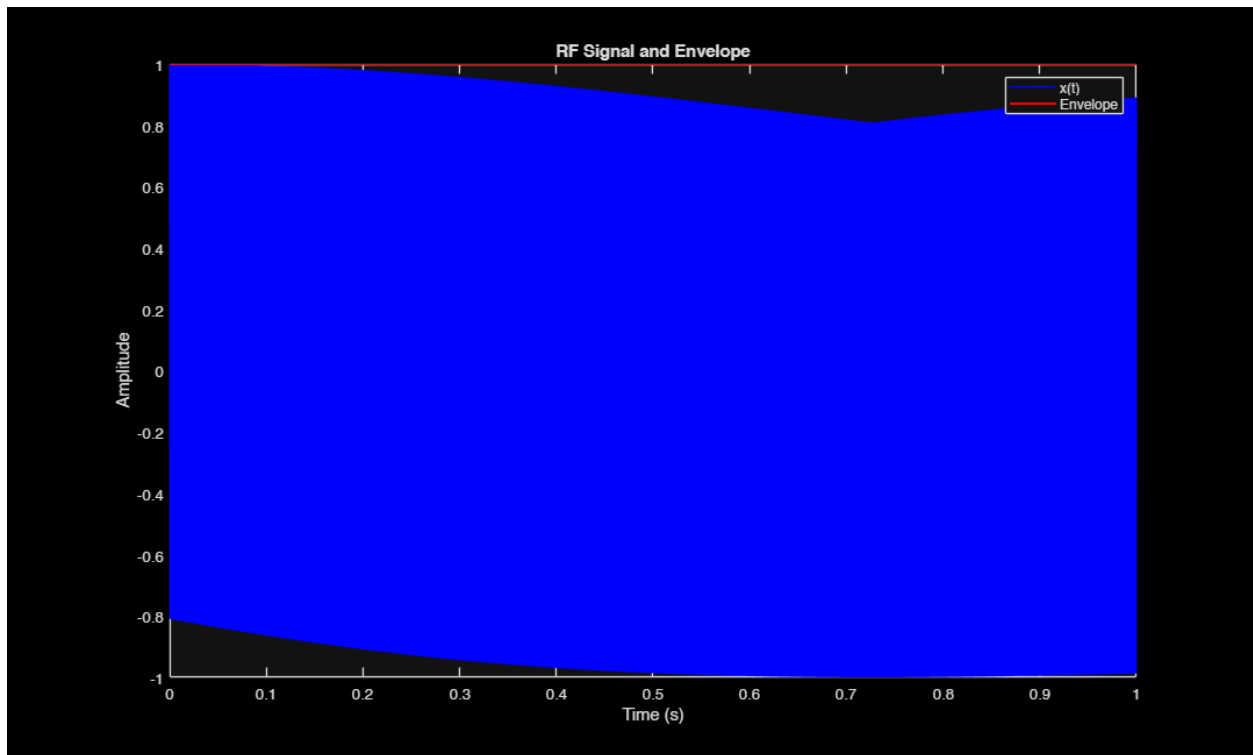
t_vals = 0:1/sample_rate:1;
I = 1 ./ sqrt(1+t_vals.^2);
Q = t_vals ./ sqrt(1+t_vals.^2);

x_t = I .* cos(2*pi*f0*t_vals) - Q .* sin(2*pi*f0*t_vals);

envelope = ones(size(t_vals));

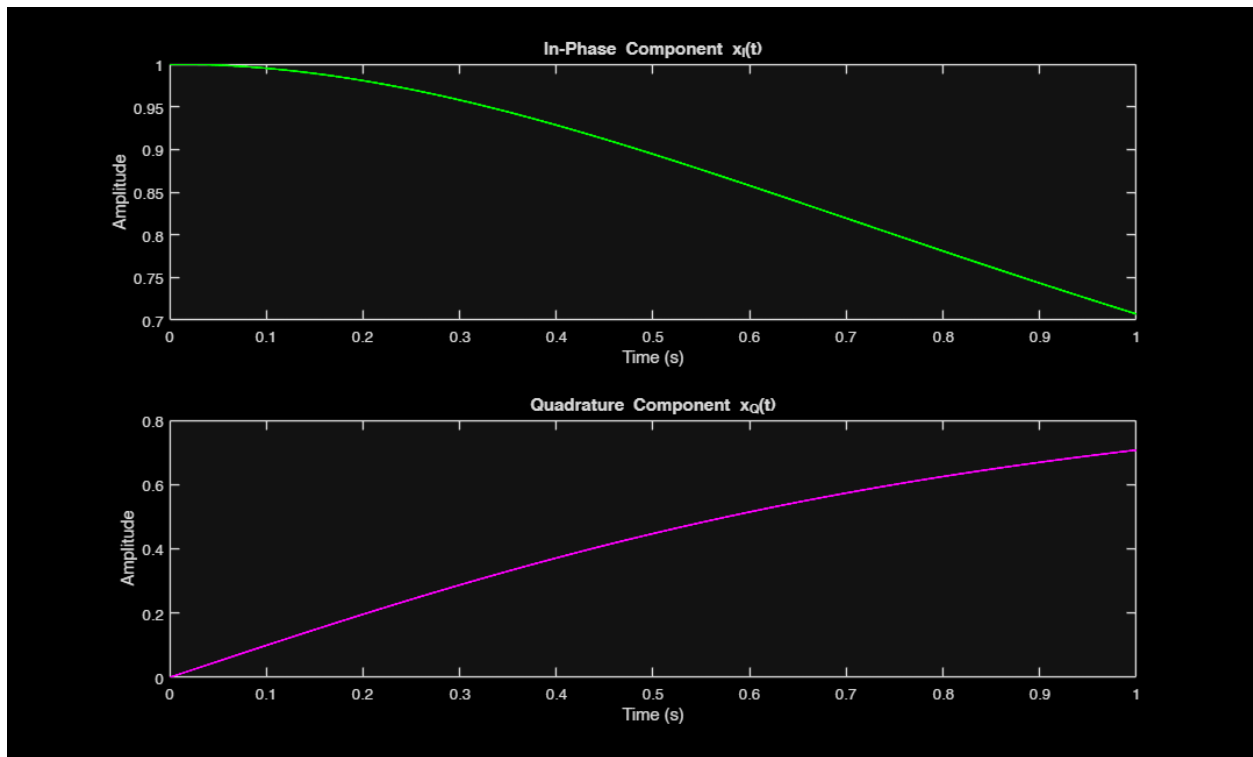
figure;
plot(t_vals, x_t, 'b');
hold on;
plot(t_vals, envelope, 'r', 'LineWidth', 1.5);
hold off;

legend('x(t)', 'Envelope');
xlabel('Time (s)');
ylabel('Amplitude');
title('RF Signal and Envelope');
```



**figure 2**

```
figure;  
subplot(2,1,1);  
plot(t_vals, I, 'g', 'LineWidth', 1.5);  
title('In-Phase Component  $x_I(t)$ ');  
xlabel('Time (s)');  
ylabel('Amplitude');  
  
subplot(2,1,2);  
plot(t_vals, Q, 'm', 'LineWidth', 1.5);  
title('Quadrature Component  $x_Q(t)$ ');  
xlabel('Time (s)');  
ylabel('Amplitude');
```



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