Basic Sequences

Contents

Part (a) Unit Sample

We begin by creating a simple plot of an impulse.

```
n = -10:10;
x1 = n == 0;
```

Part (b) Unit Step

In part 2 we create the unit step by plotting a 1
anytime n is greater than or equal to 0

```
x2 = n >= 0;
```

Part (c) Real Exponential

This part is a little more tricky. First we create a new Unit step that has been shifted by 3 to match the plot. Then we create variables for the decay. This should be between 0 and 1 to create the proper graph. Then by dot multiplying the shifted signal by the exponential output we can get the graph we are looking for.

```
x3 = n >= -3;

decay = .2;
expon = 1 * exp(-(n)  * decay);
x3 = expon .* (x3);
```

Part (d) Sinusoidal

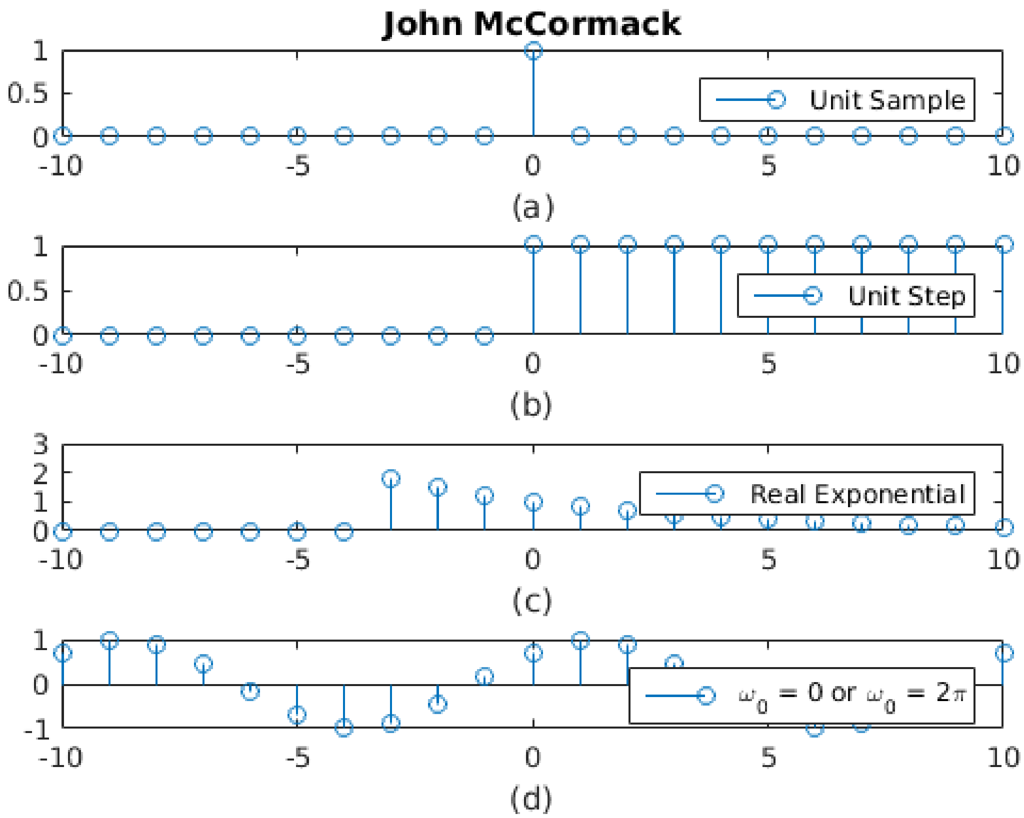
Here we create a variable for the period and the phase to help make adjustments. The values listed below created an output that closely resembled that of the provided graph.

```
phase = -1 * pi/4;
T = 10;

x4 = cos(2 * pi .* n ./ T + phase);
```

Plotting

Below is all of the needed code to handle the actual ploting of the data. Nothing special here.

```
subplot(4,1,1); stem(n,x1);
legend('Unit Sample');
xlabel('(a)');
title('John McCormack');

subplot(4,1,2); stem(n, x2);
legend('Unit Step');
xlabel('(b)');

subplot(4,1,3); stem(n,x3);
axis([-10 10 0 3]);
legend('Real Exponential');
xlabel('(c)');

subplot(4,1,4); stem(n, x4);
legend('Sinusoidal');
xlabel('(d)');

% Special Characters

legend('\omega_0 = 0 or \omega_0 = 2\pi');
```



Flip and Shift

Now we will create a signal, then flip it, and then shift the flipped version.

First Signal (a)

Next we will create the original signal according to the specification.

```
h = [0 0 0 0 0 0 2 4 6 8 7 6 5 4 3 2 1 0 0];
n = [1:length(h)] - round(length(h) / 2);
```

Flipped (b)

Below we will flip h[n] to do this we simply copy the matrix, starting from the end and working backwards.

```
hflip = h(end:-1:1);
```

Shifting (c)

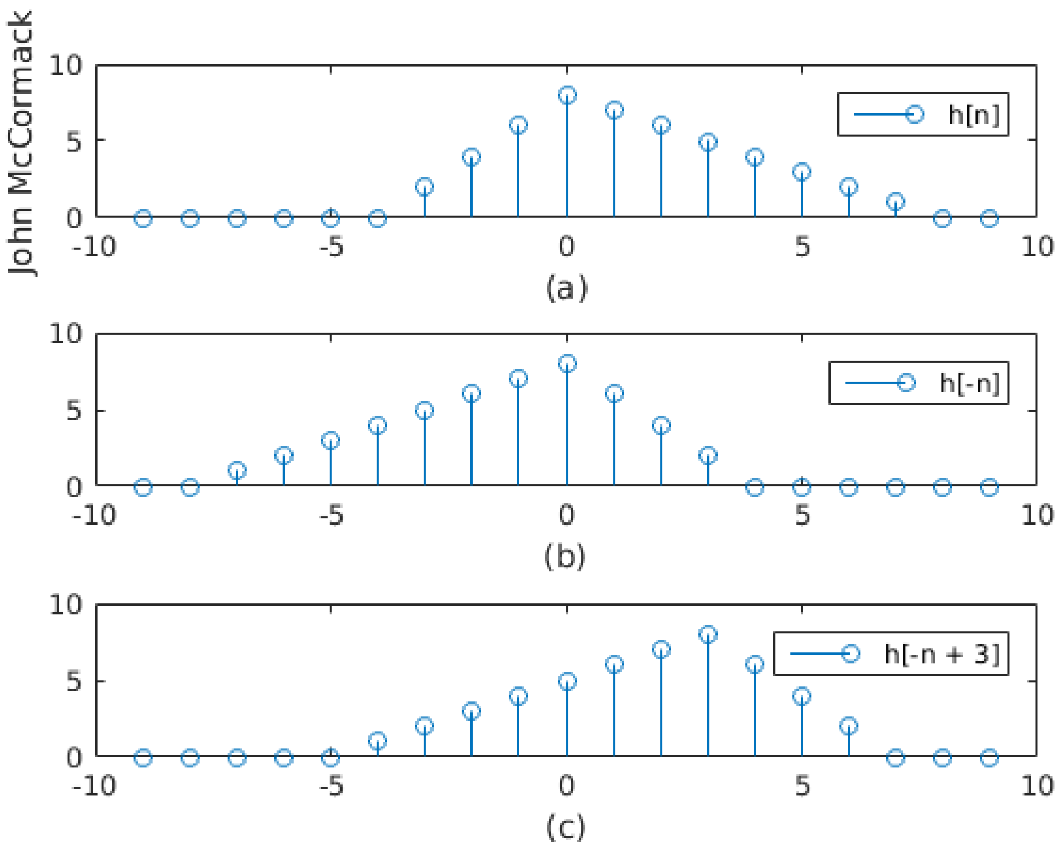
Next we will take the flipped signal and shift it by 3 bits. To do this we prepend a matrix of 0's to our original matrix. We will also need to shrink the size of our original matrix in order to account for the change.

```
hshift = [zeros(1,3) hflip(1:end-3)];
```

Printing

Again we print out all graphs to see the changes we made. To begin we use the 'figure' command to generate a new plot.

```
figure;

subplot(3,1,1); stem(n, h);
legend('h[n]');
xlabel('(a)');
ylabel('John McCormack');

subplot(3,1,2); stem(n, hflip);
legend('h[-n]');
xlabel('(b)');

subplot(3,1,3); stem(n, hshift);
legend('h[-n + 3]');
xlabel('(c)');
```



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