Line Coding

A Laboratory Report Presented to
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Second Laboratory

ECE 106.1 - **Modulation & Coding Techniques**

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OBJECTIVE

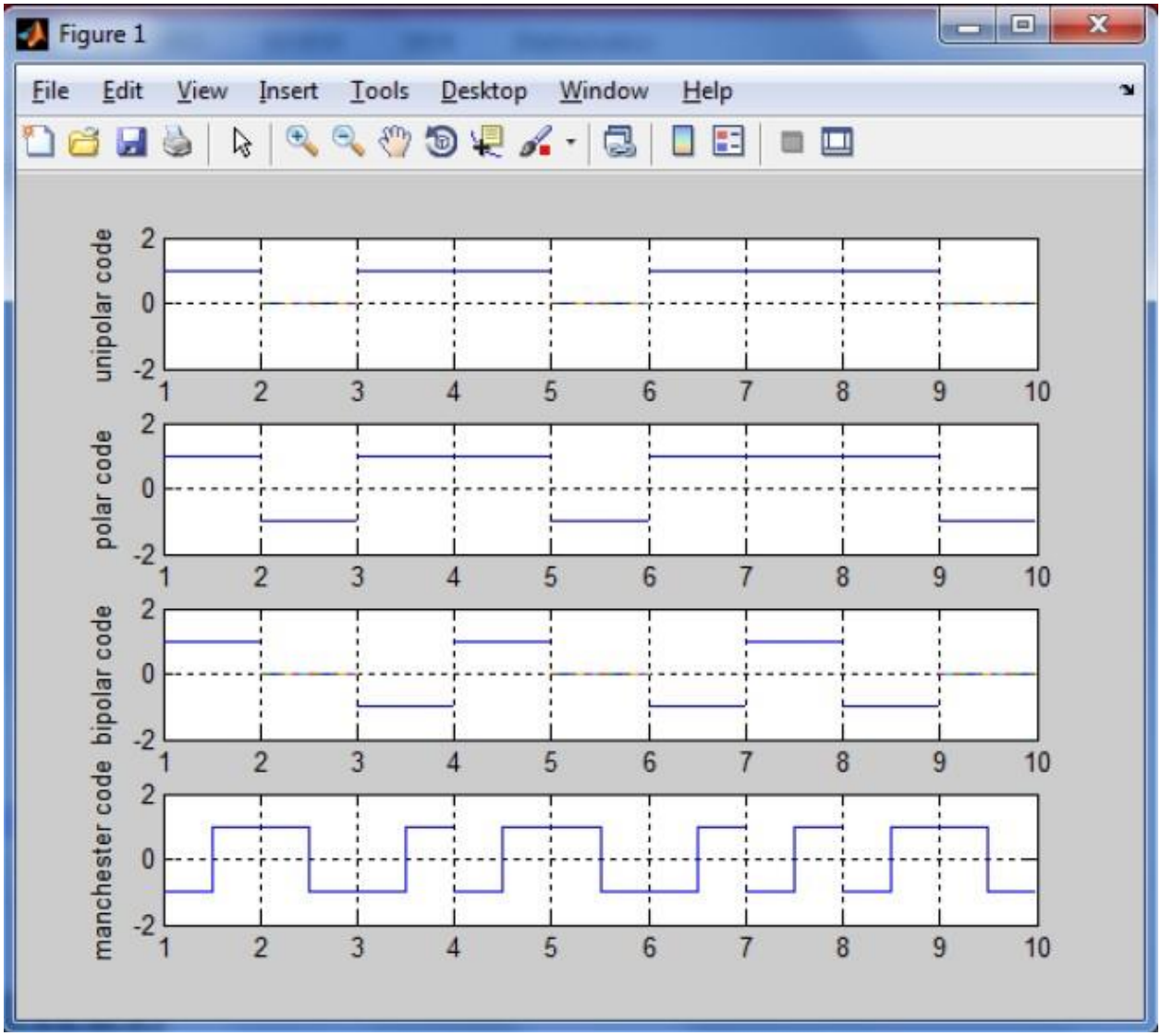
To write the MATLAB code for line coding

THEORY:

Line coding consists of representing the digital signal to be transported by an amplitude- and time-discrete signal that is optimally turned for the specific properties of the physical channel (and of the receiving equipment). The waveform pattern of voltage or current used to represent the 1s and 0s of a digital data on a transmission link is called line encoding. The common types of line encoding are unipolar, polar, bipolar, and Manchester encoding.

OUTPUT

Output waveform for the bit stream [1 0 1 1 0 1 1 1 0]

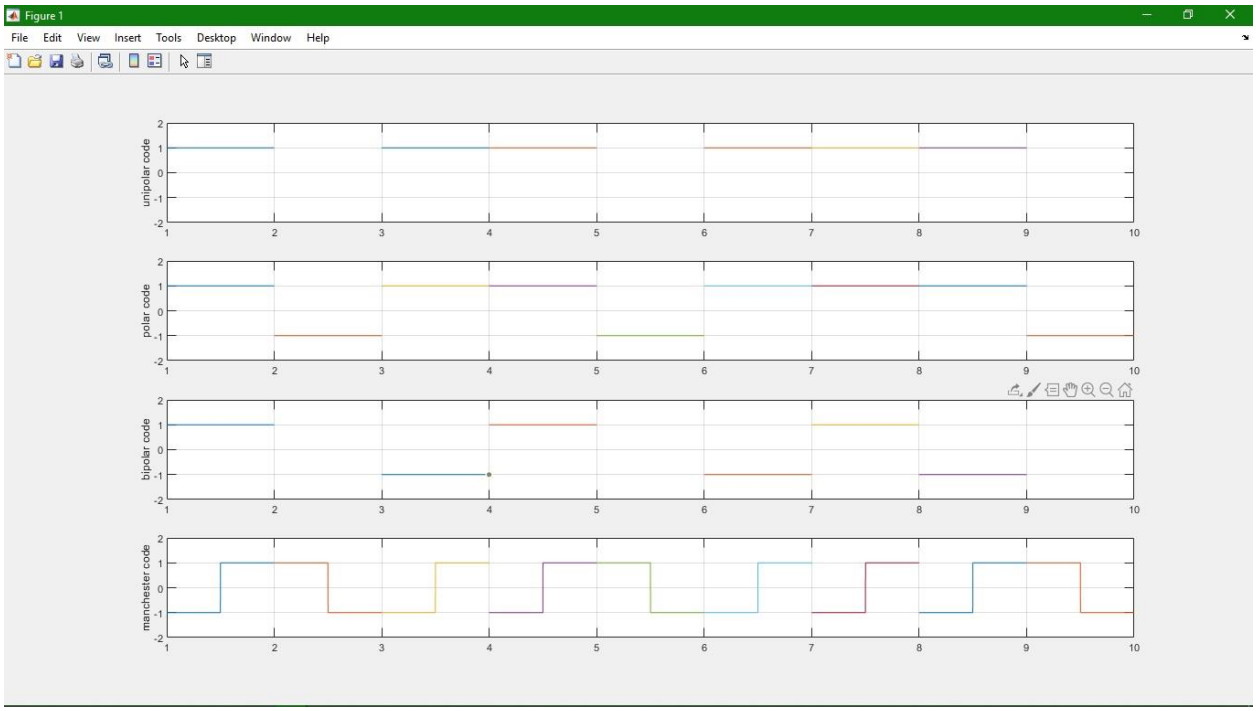


MATLAB SYNTAX USED:

```
x=[1 0 1 1 0 1 1 1 0]
nx=size(x,2)
sign=1
i=1
while i<nx+1
   t = i:0.001:i+1-0.001
   if x(i)==1
      unipolar_code=square(t*2*pi,100)
      polar_code=square(t*2*pi,100)
      bipolar_code=sign*square(t*2*pi,100)
```

```
        sign=sign*-1
        manchester_code=-square(t*2*pi,50)
    else
        unipolar_code=0
        polar_code=-square(t*2*pi,100)
        bipolar_code=0
        manchester_code=square(t*2*pi,50)
    end
    subplot(4,1,1)
    plot(t,unipolar_code)
    ylabel('unipolar code')
    hold on
    grid on
    axis([1 10 -2 2]
    subplot(4,1,2)
    plot(t,polar_code);
    ylabel('polar code')
    hold on
    grid on
    axis([1 10 -2 2])
    subplot(4,1,3)
    plot(t,bipolar_code)
    ylabel('bipolar code')
    hold on
    grid on
    axis([1 10 -2 2]);
    subplot(4,1,4)
    plot(t,manchester_code)
    ylabel('manchester code')
    hold on
    grid on
    axis([1 10 -2 2])
    i=i+1
end
```

OUTPUT:



Conclusion:

We set the output bitstream as x = 1 0 1 1 0 1 1 1 0, which resulted to a plot from 1 to 10, if we have only set a sequence of having just n = 6 will result in an incomplete set of waveforms. For the Unipolar code, we could see that it is blank as the stream is set to zero, but supposedly it has a line in zero. We could see that logic 1 results in a straight line covering 1 unit, we could see that it has zero as the last result. Similarly for Polar code, it has the same result with unipolar code when it is a logic 1, but not the same as when it is 0, a 0 results in a straight line in -1.

For the bipolar code, the graph is not consistent after every logic 1, the next logic 1 will hold a different graph having a straight line on -1 for the latter and 1 for the former, for short it changes from 1 to -1 as a logic 1 is repeated, it doesn't matter when a logic 1 is followed by a logic 0, the following logic 1 will change the position.

As for the Manchester code, we could observe that for logic 1 it results in the first half of a square wave and the second half of it for logic 0.