### ELEC 5705 RF Systems Design: Assignment #3

Due March 8th, 2021 (late assignments will be penalized at 25% per day)

In this assignment you will be provided with an RF signal received by an antenna. The spectrum of the signal looks like this:



Your goal is to demodulate Bryan Adams who is being transmitted at 100MHz at a rate of 1Msymbol/sec. Beware of Justin Bieber who may be polluting the airways at other frequencies. The modulation being used is very straight forward QPSK:

% | Q (0,1)

% |

% |

% (1,1) | (0,0)

%------------------------I

% |

% |

% |

% | (1,0)

In order to aid in aligning the phase the first 8 bits transmitted are: 11 11 11 11.

Once you recover the data make an array of 8 bit numbers like this:

(first number) 11 11 11 11

(second number) 01 11 01 10

(third number) 01 10 11 10

and so on….

Once you have done this use the command:

soundsc (variable)

to play back 2 seconds of a famous song. Again beware Justin Bieber! If I hear him instead of Bryan Adams my ears will start bleeding and you will lose marks.

Find Bryan using ideal components and filters as needed.

The RF file with the voltage waveform called “RF” will be available on the web site. Some notes:

The points in the file are spaced by 1e-9seconds. Thus a time variable corresponding to this file can be constructed by the commands:

tstep = 1e-9;

time = 0:tstep: tstep\*length(RF)-tstep;