1) radix 2 thing and how to calculate magnitude of Z, Wn, euler formula

2) magnitude of butterfly model; how to prevent overflow

3) what is FFT, написать формулу, как считается W и расписать формулу. Что такое магнитуда. Какие типы фильтров итд

4) why the C program he gave returned a different value from the Matlab fft and the radix 2 fft that we do by hand

The answer to this is... at every stage in the fft... the value should range between 1 and -1... but addition and subtraction with every butterfly pair doubles that range... that is 2 to -2

Which means the effective value is actually doubled at every node when using the C program

The solution for this is shifting the bit values one bit to the right, which effectively divides by 2

This can be done in butterfly.c by increasing the number of bits by which the values are right shifted from 15 to 16

So you'll then always divide your node results by 2 at every node, giving you always the correct value