Makiya Crochiere

Project 1 Hamming Code

Program Description:
This program is my implementation of Hamming's code error correction. For my attempt I went for a B range so my program allows for both Hamming(7,4) and Hamming(15, 11). I however ran into a few issues in regards to the Hamming(15, 11). My issue was primarily centered around the Parity Check matrix. Currently my program is able to work with example values for Hamming(15, 11) written in the B section, but for randomly generated values it doesn't always work. For this reason I have left commented versions that would allow me to override the values of the message and error inorder to give the desired result. The program does work correctly for any randomly generated Hamming(7,4) messages.

Algorithms and Libraries:
The Libraries that were used were random and numpy. Random was used to generate the random values for messages and to create a random error within the message. Numpy was used to multiply the various matrices together.

Functions and Structure:
randomGen: generates the random message depending on how many values are desired
Encode: will encode the message to whatever Hamming type is specified
GenError: will have a chance to generate a single bit error within the message
Correct: will use parity check and correct the error within the message
Convert: will take the parity check value and convert it into an integer to fix the error
Decode: will take the encoded message and decode depending on the Hamming type
ParityCheck: is used to determine if an error is present within the message
checkError: is a helper function to see if there is a one within the resultant parity matrix
Main: Handels user input and outputs message information to the command prompt

Testing:
With the Hamming(7,4) testing went smoothly since you provided us with all the matrices required to do the error checking. Unfortunately when looking for information on the Hamming(15,11) matrices there was lots of conflicting information online so what I did was try a lot of different parity matrices until I got one that was able to work with the example messages. Unfortunately it only worked with the example matrices and will sometimes work with randomly generated values.

Submission:
Within this submission there are two items. This document you are reading now and Hamming.py. In order for this program to work you will need both random and numpy. Once you run the program you will be prompted to enter x for Hamming(7,4) or y for Hamming(15, 11). If you insert an incorrect type it will default to Hamming(15,11). To run Hamming(15,11) with example values just un comment the lines underneath the comments "# override for Hamming(15,11)"