Computer Ciphers

1. Find the decimal representation of the binary number 11000111.

2. Find the binary representation of the decimal number 123.

3. About how many binary digits does the decimal number 10^{17} = 100,000,000,000,000,000 have?

4. Add the binary numbers 101 and 111. Check your work by converting to decimal, then adding, then converting back to binary.

5. On page 247 of Singh's *The Code Book*, the message HELLO and the key DAVID are converted to ASCII, then binary, then added to produce ciphertext. Check Singh's math.

Message	HELLO
Message in ASCII	1001000 1000101 1001100 1001100 1001111
Key = DAVID	1000100 1000001 1010110 1001001 1000100
Ciphertext	0001100 0000101 0000110 1010000 1010001 1011

6. Encrypt the message HELLO using the key 541, a prime number.

7. See if you can decode the following tweet.