To calculate the probability **p**, we simply need to compare the input sequence **x** with the sequence **y** to observe how many bits have changed, and then calculate the ratio: number of correct bits / total bits.

```
x = kodikopoihsh
y = binary_symmetric_channel(x);
sostabit = sum(x == y);
sinolikabit = length(x);
p = sostabit / sinolikabit;
```

The comparison is done with **x == y**, which creates an array of 0s and 1s (false, true), and we sum them to find how many 1s (correct bits) were transmitted through the channel. Finally, we find:

```
p: 0.88
```

ext, to calculate the channel capacity, we use the formulas **C = 1 - H(p)** and **H(p) = -p * $\log_2$(p) – (1 - p) * $\log_2$(1 - p)**, and we get bits/sec.

```
Xorithkothta kanaliou: 0.47075
```
bits/sec.

The mutual information will be found using the formula **I(X|Y) = H(X) - H(p)**. It is necessary to calculate the probability distribution of the input because the value of **H(X)** is affected by it. Let's calculate the probabilities based on the encoded sequence from question 4.

To find the symbol probabilities, we just divide their number of occurrences by the total number of bits. Then, we simply substitute these values into the formula for **H(X)**.

```
arithmos_0 = sum(kodikopoihsh == '0');
arithmos_1 = sum(kodikopoihsh == '1');
olatabit = length(kodikopoihsh);

pithanotita_0 = arithmos_0 / olatabit;
pithanotita_1 = arithmos_1 / olatabit;
H_X = - (pithanotita_0 * log2(pithanotita_0) + pithanotita_1 *
log2(pithanotita_1));


amoivaia_pliroforia = H_X - H_p;

disp(['Amoivaia Pliroforia: ', num2str(amoivaia_pliroforia)]);
```

So we find the mutual info
```
Amoivaia Pliroforia: 0.46296
```
bits.