Golomb Encoding and Decoding for Strings

```
clc;
clear;

% Define the input string and Golomb parameter
input_string = 'BANANA$';
m = 4;

% Calculate the original size in bits (each character is 8 bits in ASCII)
original_size = length(input_string) * 8;  % 8 bits per character

% Encode the string
encoded_data = golomb_encode_string(input_string, m);
disp('Encoded Data:');
```

```
Encoded Data:
```

```
disp(encoded_data);
```

```
  Columns 1 through 20

     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     0     1     0

  Columns 21 through 40

     1     1     1     1     1     1     1     1     1     1     1     1     1     1     0     0     1     1

  Columns 41 through 60

     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     0     1

  Columns 61 through 80

     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     0     0     1

  Columns 81 through 100

     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     0

  Columns 101 through 120

     0     1     1     1     1     1     1     1     1     1     1     1     1     1     1     1     0     0

  Columns 121 through 132

     1     1     1     1     1     1     1     1     1     0     0     0
```

```
% Calculate the compressed size in bits
compressed_size = length(encoded_data);  % Bits required for the encoded data

% Calculate the compression ratio
compression_ratio = original_size / compressed_size;
disp(['Compression Ratio: ', num2str(compression_ratio)]);
```

```
Compression Ratio: 0.42424
```

```
% Decode the encoded data back into a string
decoded_string = golomb_decode_string(encoded_data, m);
disp('Decoded String:');
```

```
Decoded String:
```

```
disp(decoded_string);
```

```
BANANA$
```

```
% Check if the decoded string matches the original string
if isequal(decoded_string, input_string)
    disp('Success: Decoded string matches the original string.');
else
    disp('Error: Decoded string does not match the original string.');
end
```

```
Success: Decoded string matches the original string.
```