LZ77 / LZ78 Encoding and Decoding

```
clc; clear; close all;

% Input string
input_text = 'BANANA$';

% LZ77 Encoding and Decoding
window_size = 10;  % Sliding window size for LZ77
encoded_data_lz77 = lz77_encode(input_text, window_size);
decoded_text_lz77 = lz77_decode(encoded_data_lz77);

% LZ78 Encoding and Decoding
encoded_data_lz78 = lz78_encode(input_text);
decoded_text_lz78 = lz78_decode(encoded_data_lz78);

% Display results for LZ77
disp('LZ77 Results:');
```

```
LZ77 Results:
```

```
disp(['Original Text: ', input_text]);
```

```
Original Text: BANANA$
```

```
disp(['Encoded Data: ', mat2str(encoded_data_lz77)]);
```

```
Encoded Data: [0 0 66;0 0 65;0 0 78;2 2 65;0 0 36]
```

```
disp(['Decoded Text: ', decoded_text_lz77]);
```

```
Decoded Text: BANANA$
```

```

% Calculate sizes and compression ratio for LZ77
original_size = length(input_text) * 8;  % Assuming 8 bits per character
compressed_size_lz77 = size(encoded_data_lz77, 1) * (8 + 8 + 8);  % Each tuple is (offset, leng
compression_ratio_lz77 = original_size / compressed_size_lz77;

disp(['Original Size (bits): ', num2str(original_size)]);
```

```
Original Size (bits): 56
```

```
disp(['Compressed Size (bits): ', num2str(compressed_size_lz77)]);
```

```
Compressed Size (bits): 120
```

```
disp(['Compression Ratio: ', num2str(compression_ratio_lz77)]);
```

```
Compression Ratio: 0.46667
```

```

% Display results for LZ78
disp('LZ78 Results:');
```

```
LZ78 Results:
```

```
disp(['Original Text: ', input_text]);
```

```
Original Text: BANANA$
```

```
disp(['Encoded Data: ', mat2str(encoded_data_lz78)]);
```

```
Encoded Data: [0 66;0 65;0 78;2 78;2 36]
```

```
disp(['Decoded Text: ', decoded_text_lz78]);
```

```
Decoded Text: BANANA$
```

```
% Calculate sizes and compression ratio for LZ78
compressed_size_lz78 = size(encoded_data_lz78, 1) * (8 + 8);  % Each tuple is (index, char)
compression_ratio_lz78 = original_size / compressed_size_lz78;

disp(['Original Size (bits): ', num2str(original_size)]);
```

```
Original Size (bits): 56
```

```
disp(['Compressed Size (bits): ', num2str(compressed_size_lz78)]);
```

```
Compressed Size (bits): 80
```

```
disp(['Compression Ratio: ', num2str(compression_ratio_lz78)]);
```

```
Compression Ratio: 0.7
```