Output:

```
You, 30 minutes ago | 1 author (You)
1  import cv2
2  import os
3  image = cv2.imread('lenna.jpg')
4  cv2.imwrite('lenna.png', image)
5  cv2.imwrite('lenna.tif', image)
6
7  def get_uncompressed_size(image):
8      height, width, channels = image.shape
9      return (height * width * channels) / 1024
10
11 def get_compressed_size(file_path):      You, 30 minutes ago • new
12     return os.path.getsize(file_path) / 1024
13
14 uncompressed_jpg_size = get_uncompressed_size(image)
15 compressed_jpg_size = get_compressed_size('lenna.jpg')
16 compressed_png_size = get_compressed_size('lenna.png')
17 compressed_tif_size = get_compressed_size('lenna.tif')
18
19 print(f"Uncompressed JPG size: {uncompressed_jpg_size:.2f} KB")
20 print(f"Compressed JPG size: {compressed_jpg_size:.2f} KB")
21 print(f"Compressed PNG size: {compressed_png_size:.2f} KB")
22 print(f"Compressed TIFF size: {compressed_tif_size:.2f} KB")
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL powershell - multimedia

```
PS C:\Users\ishwo\Desktop\it-is-it\practical> cd multimedia
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia> python convertToPng.py
Uncompressed JPG size: 26367.19 KB
Compressed JPG size: 1423.03 KB
Compressed PNG size: 15810.42 KB
Compressed TIFF size: 15452.07 KB
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia>
```

Output:

cropJpg.py > ...

```python
import cv2
import numpy as np

image = cv2.imread('lenna.jpg')
if image is None:
    print("Error: Image not found. Ensure 'lenna.jpg' is in the working directory.")
    exit()

cropped_image = image[100:600, 100:600]
cv2.imshow("Cropped Image", cropped_image)
cv2.waitKey(0)  # Wait until a key is pressed
cv2.destroyAllWindows()
```

PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL Code

```
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia> python -u "c:\Users\ishwo\Desktop\it-is-it\practical\multimedia\cropJpg.py"
Cropped image saved as 'cropped_lenna.jpg'
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia>
```

Cropped_lenna.jpg:

cropped_lenna.jpg

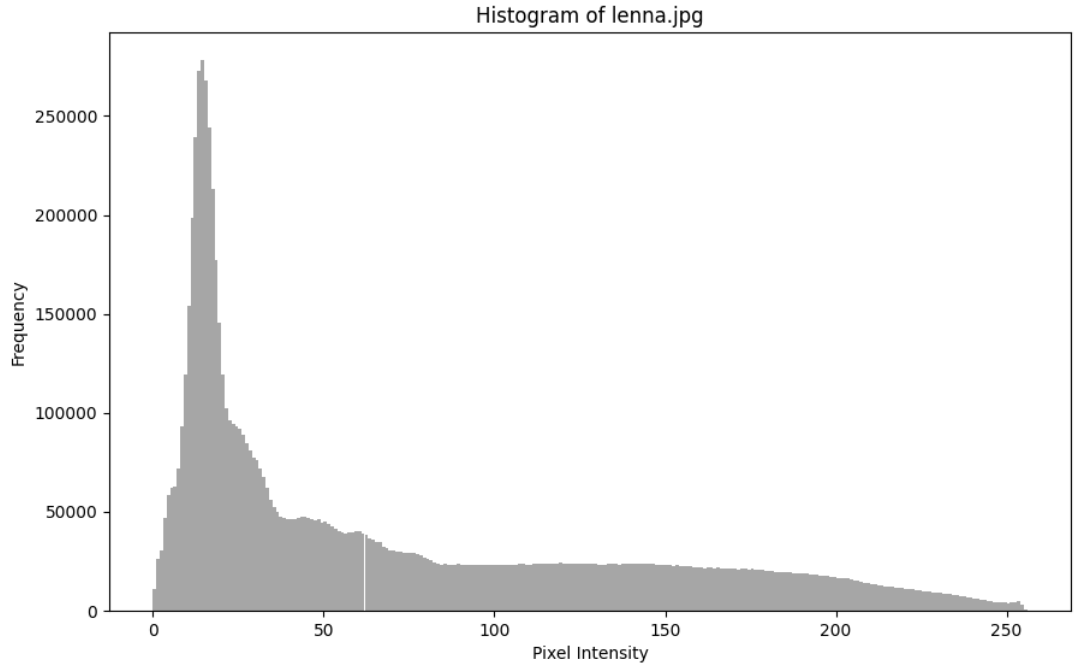
Output:

Binary Image:

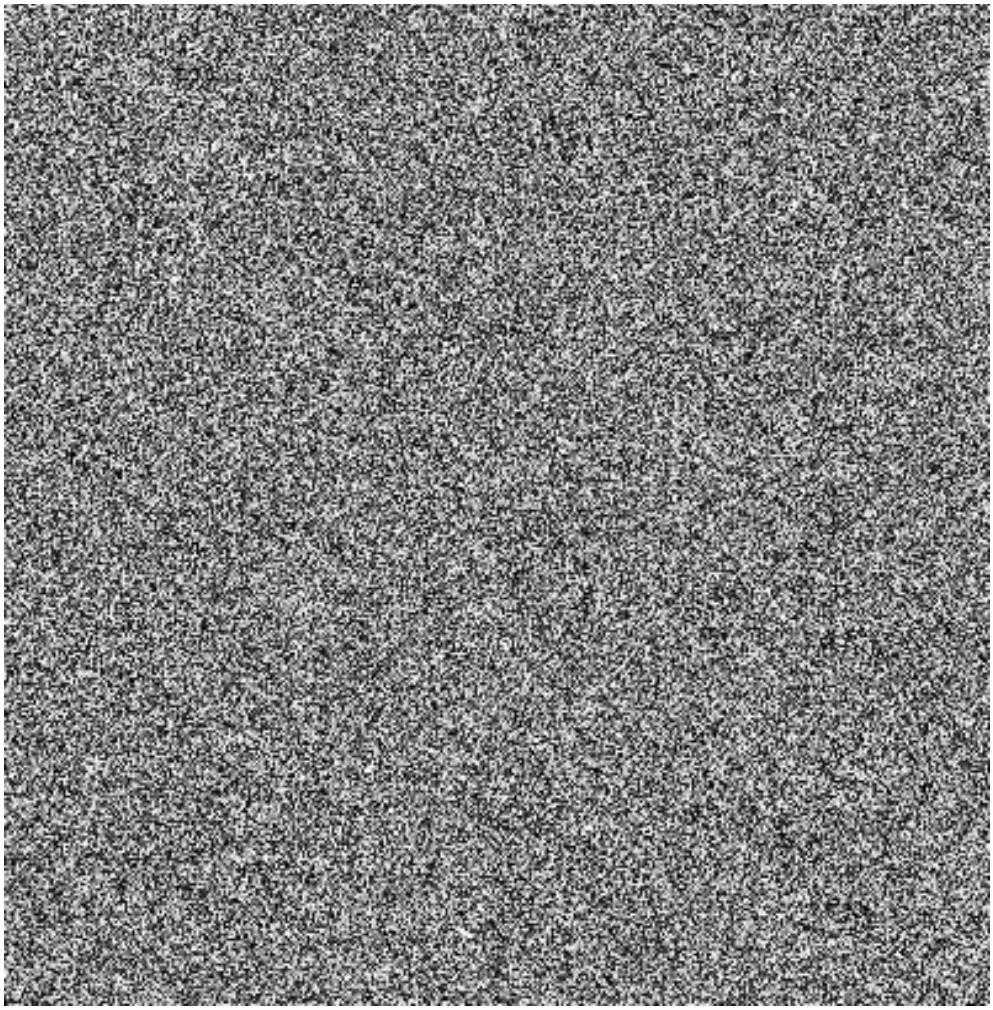
Grayscale Image:

Dithered Image Output:

Output:

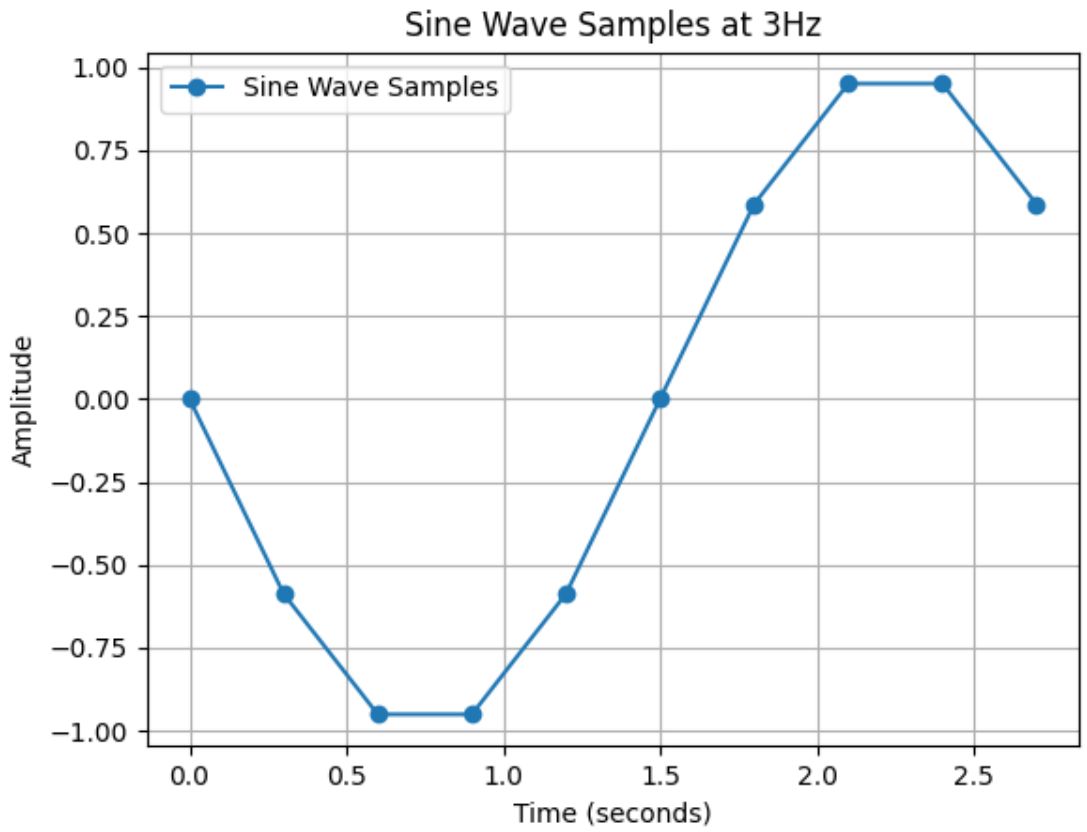

Histogram of lenna.jpg
Frequency
Pixel Intensity
0
50000
100000
150000
200000
250000
0
50
100
150
200
250

Output:

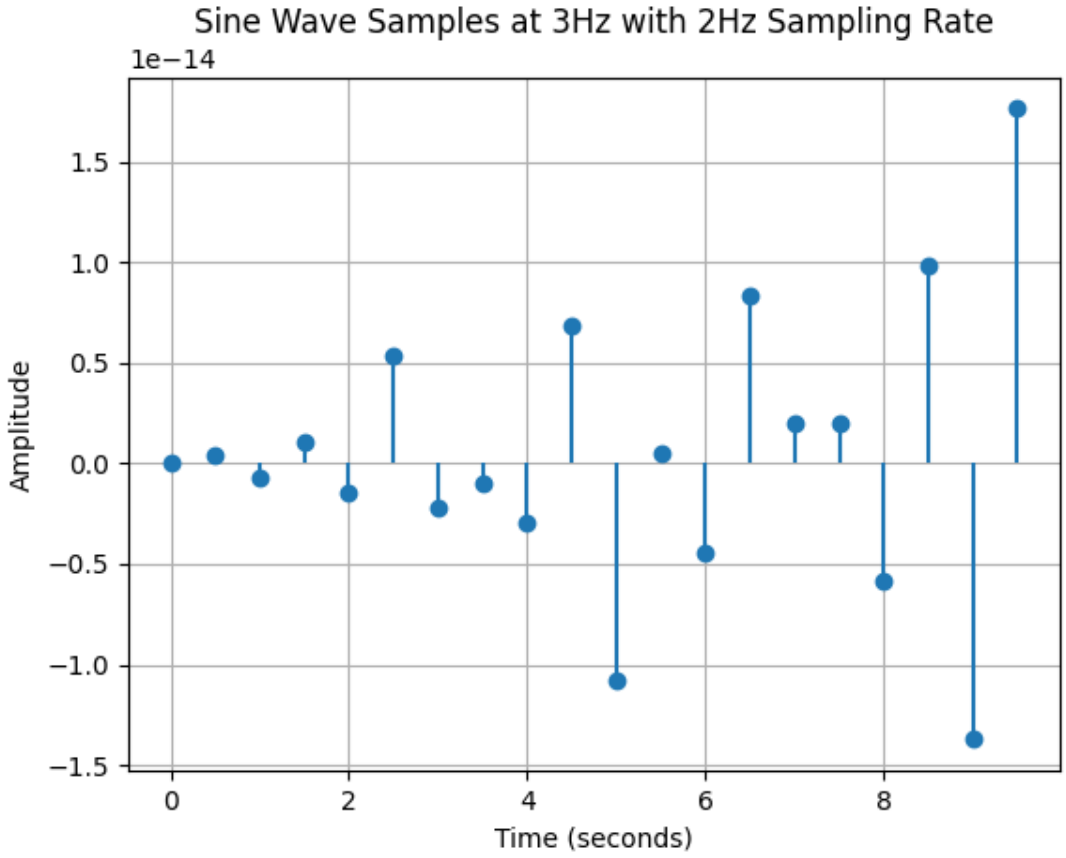


Output:

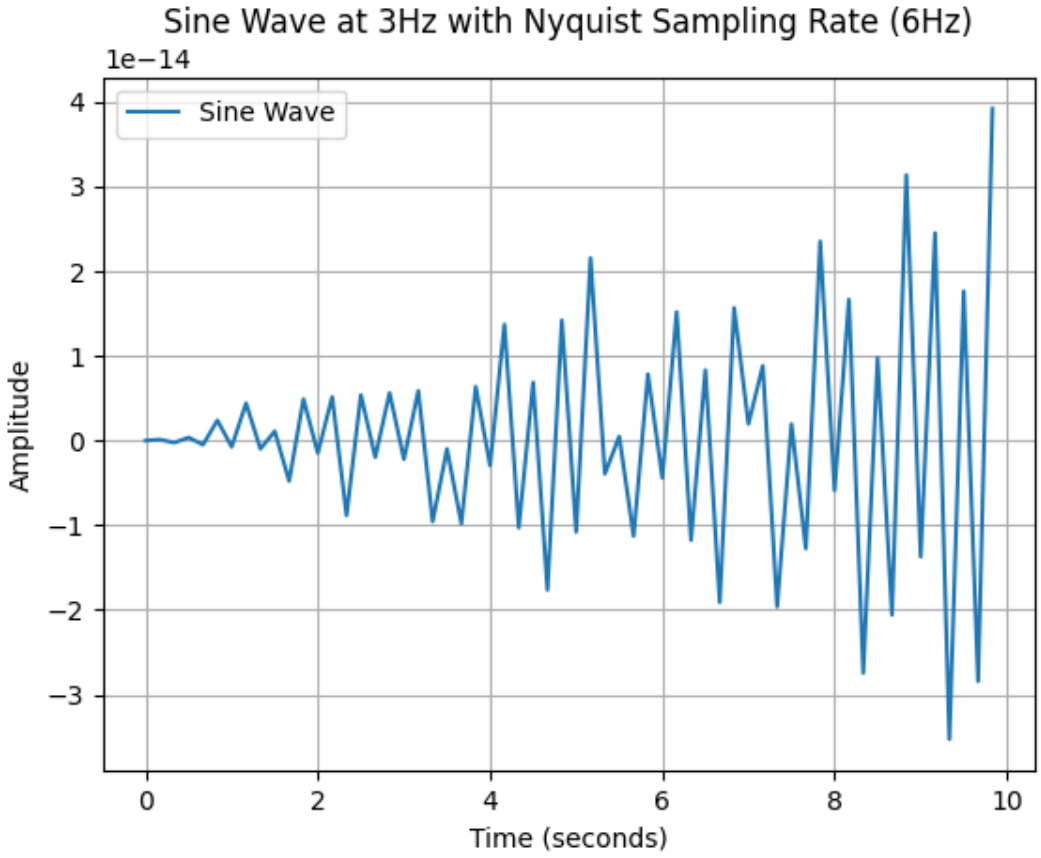
Output:


Sine Wave Samples at 3Hz
Sine Wave Samples
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
Amplitude
0.0
0.5
1.0
1.5
2.0
2.5
Time (seconds)

Output:


Sine Wave Samples at 3Hz with 2Hz Sampling Rate
1e−14
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
Amplitude
0
2
4
6
8
Time (seconds)

Output:


Sine Wave at 3Hz with Nyquist Sampling Rate (6Hz)
1e−14
Sine Wave
Amplitude
Time (seconds)
4
3
2
1
0
−1
−2
−3
0
2
4
6
8
10

Output:

multimedia > wavFile.py > ...

```python
import wave

    (function) def get_wave_parameters(wav_file_path: Any) -> None
def get_wave_parameters(wav_file_path):
    with wave.open(wav_file_path, 'rb') as wav_file:
        num_channels = wav_file.getnchannels()  # Number of channels
        sampwidth = wav_file.getsampwidth()  # Sample width (bit depth)
        framerate = wav_file.getframerate()  # Sampling rate (samples per second)
        num_samples = wav_file.getnframes()  # Total number of samples

        print(f"Number of Channels: {num_channels}")
        print(f"Sample Width (Bit Depth): {sampwidth * 8} bits")
        print(f"Sampling Rate: {framerate} samples per second")
        print(f"Number of Samples: {num_samples}")


wav_file_path = r"C:\Users\ishwo\Desktop\it-is-it\practical\multimedia\audio.wav"

get_wave_parameters(wav_file_path)

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL powershell - multimedia

```
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia> python wavFile.py
Number of Channels: 2
Sample Width (Bit Depth): 16 bits
Sampling Rate: 44100 samples per second
Number of Samples: 499968
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia>
```

Output:

multimedia > sineWaveAsWav.py > ...

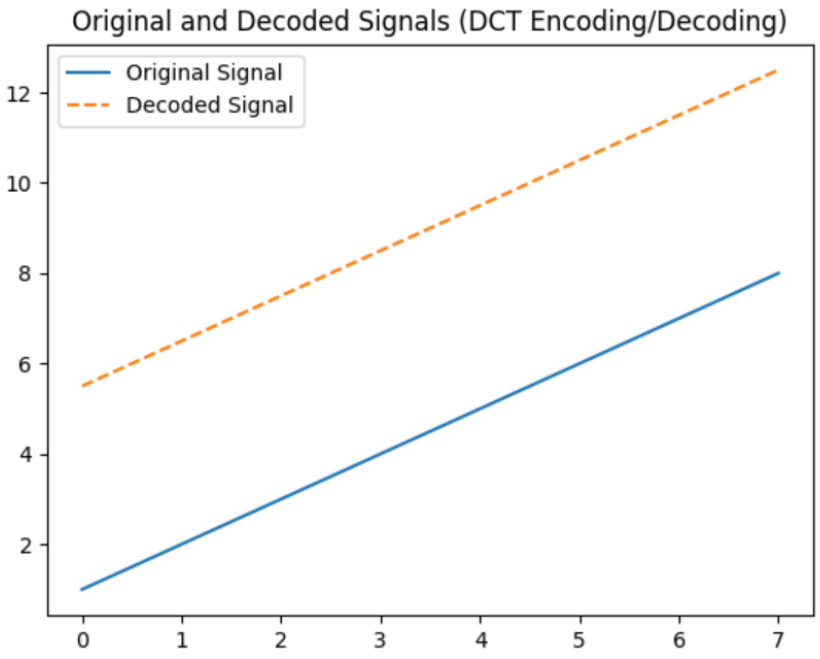
```python
import numpy as np
import wave
import struct

frequency = 4400
amplitude = 400
sampling_rate = 44100
duration = 1
phase = 0

t = np.linspace(0, duration, int(sampling_rate * duration), endpoint=False)
samples = amplitude * np.sin(2 * np.pi * frequency * t + phase)
samples = np.int16(samples)

wav_file_path = r"C:\Users\ishwo\Desktop\it-is-it\practical\multimedia\sine_wave_4400hz.wav"
with wave.open(wav_file_path, 'w') as wav_file:
    wav_file.setnchannels(1)
    wav_file.setsampwidth(2)
    wav_file.setframerate(sampling_rate)
    wav_file.writeframes(samples.tobytes())

print(f"Wave file saved at: {wav_file_path}")

```

PROBLEMS OUTPUT TERMINAL ... powershell - multimedia

```
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia> python sineWaveAsWav.py
Wave file saved at: C:\Users\ishwo\Desktop\it-is-it\practical\multimedia\sine_wave_4400hz.wav
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia>
```

Output:

multimedia > dct_signal_plot.png

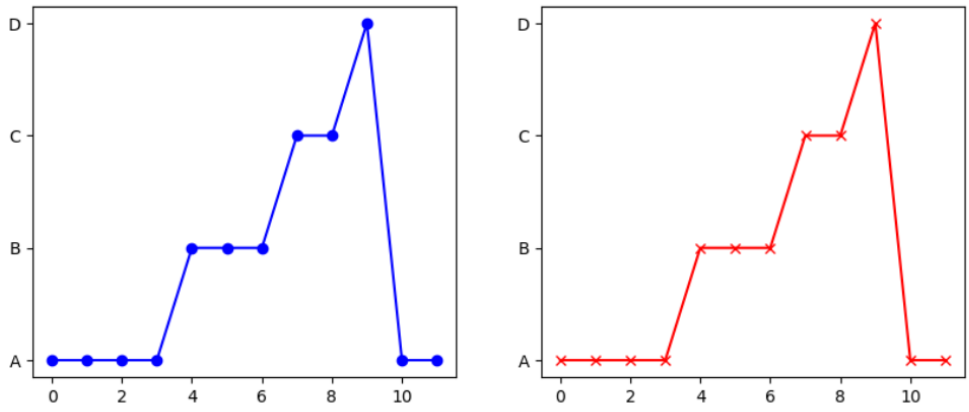


PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL powershell - multimedia

```
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia> python dct.py
Original Signal: [1. 2. 3. 4. 5. 6. 7. 8.]
DCT Encoded Signal: [ 3.60000000e+01 -1.28846460e+01 -5.32907052e-15 -1.34690960e+00
  1.11022302e-16 -4.01805807e-01 -3.13082893e-14 -1.01404646e-01]
Decoded Signal (IDCT): [ 5.5  6.5  7.5  8.5  9.5 10.5 11.5 12.5]
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia>
```

Output:

multimedia > rle_plot.png

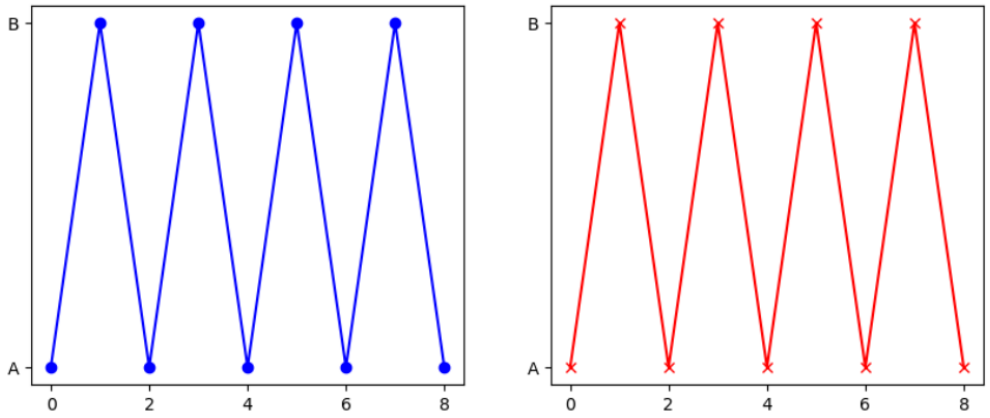


PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL powershell - multimedia

```
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia> python runLength.py
Original Data: AAAABBBCCDAA
Encoded Data: [('A', 4), ('B', 3), ('C', 2), ('D', 1), ('A', 2)]
Decoded Data: AAAABBBCCDAA
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia>
```

Output:

multimedia > lzw_plot.png




```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL        powershell - multimedia
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia> python lzwEncoding.py
Original Data: ABABABABA
Encoded Data: [65, 66, 256, 258, 257]
Decoded Data: ABABABABA
PS C:\Users\ishwo\Desktop\it-is-it\practical\multimedia>
```