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QUESTION-1

PYTHON

DATA-1:

```python
import matplotlib.pyplot as plt

def find_peaks(signal):

    maxima = []
    minima = []

    for i in range(1, len(signal) - 1):

        if signal[i] > signal[i - 1] and signal[i] > signal[i + 1]:
            maxima.append(i)

        if signal[i] < signal[i - 1] and signal[i] < signal[i + 1]:
            minima.append(i)

    return maxima, minima

def main():

    file_path = '/content/Data_1.txt'

    with open(file_path, 'r') as file:

        signal = [float(line.strip()) for line in file.readlines()]

    maxima, minima = find_peaks(signal)

    plt.figure(figsize=(10, 6))
    plt.plot(signal, label='Signal')
    plt.scatter(maxima, [signal[i] for i in maxima], color ='red',
label='Maxima', zorder=5)
    plt.scatter(minima, [signal[i] for i in minima], color='blue',
label='Minima', zorder=5)
    plt.legend()
    plt.title('Signal with Maxima and Minima Peaks')
    plt.xlabel('Index')
```
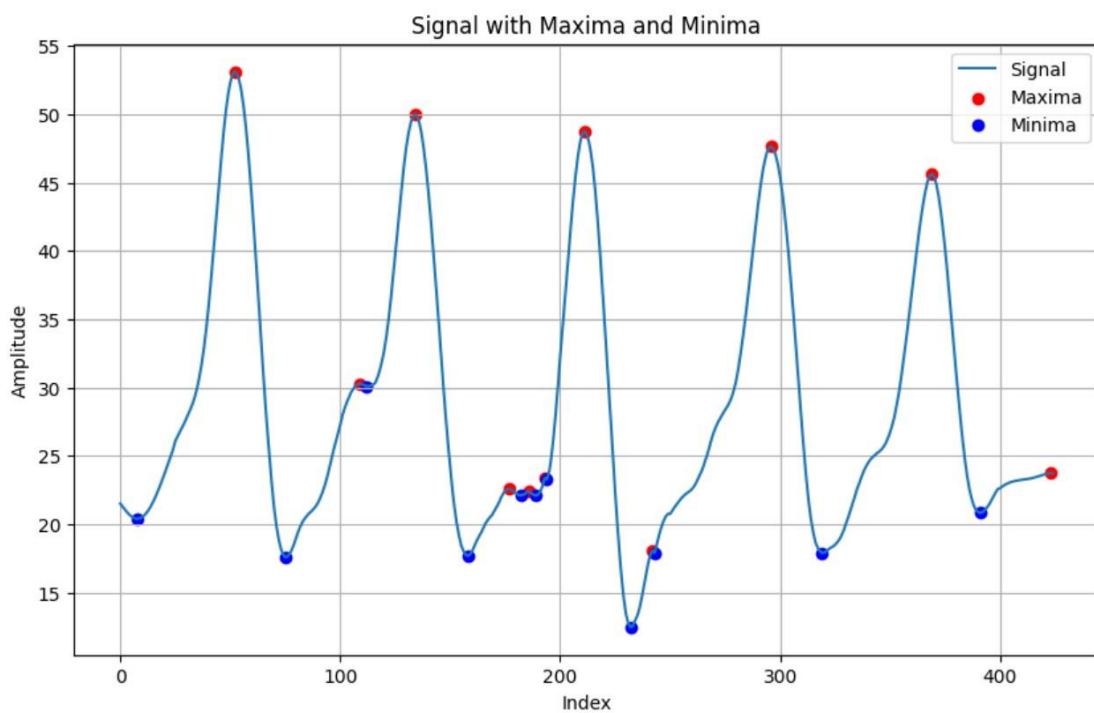
```
    plt.ylabel('Signal Value')
    plt.show()

    print("Maxima indices:", maxima)
    print("Minima indices:", minima)

if __name__ == "__main__":
    main()
```

OUTPUT:

Signal with Maxima and Minima

DATA-2 :

```
import matplotlib.pyplot as plt


def find_peaks(signal):

    maxima = []

    minima = []


    for i in range(1, len(signal) - 1):

        if  signal[i]  >  signal[i - 1]  and

signal[i] > signal[i + 1]:
```

```python
        maxima.append(i)

        if signal[i] < signal[i - 1] and
signal[i] < signal[i + 1]:

            minima.append(i)


    return maxima, minima


def main():
    # Reading data from a text file
(example with Data_2)
    with open('/content/Data_2.txt', 'r') as
file:

        signal = [float(line.strip()) for line
in file.readlines()]


    maxima, minima = find_peaks(signal)


    # Plotting the signal and marking
peaks
    plt.figure(figsize=(10, 6))
    plt.plot(signal, label='Signal')
    plt.scatter(maxima, [signal[i] for i in
maxima], color='red', label='Maxima',
zorder=5)
    plt.scatter(minima, [signal[i] for i in
minima], color='blue', label='Minima',
zorder=5)
    plt.legend()
```

```python
    plt.title('Signal with Maxima and
Minima Peaks')
  plt.xlabel('Index')
  plt.ylabel('Signal Value')
  plt.show()


    # Printing indices of maxima and
minima
  print("Maxima indices:", maxima)
  print("Minima indices:", minima)


if __name__ == "__main__":
  main()
```
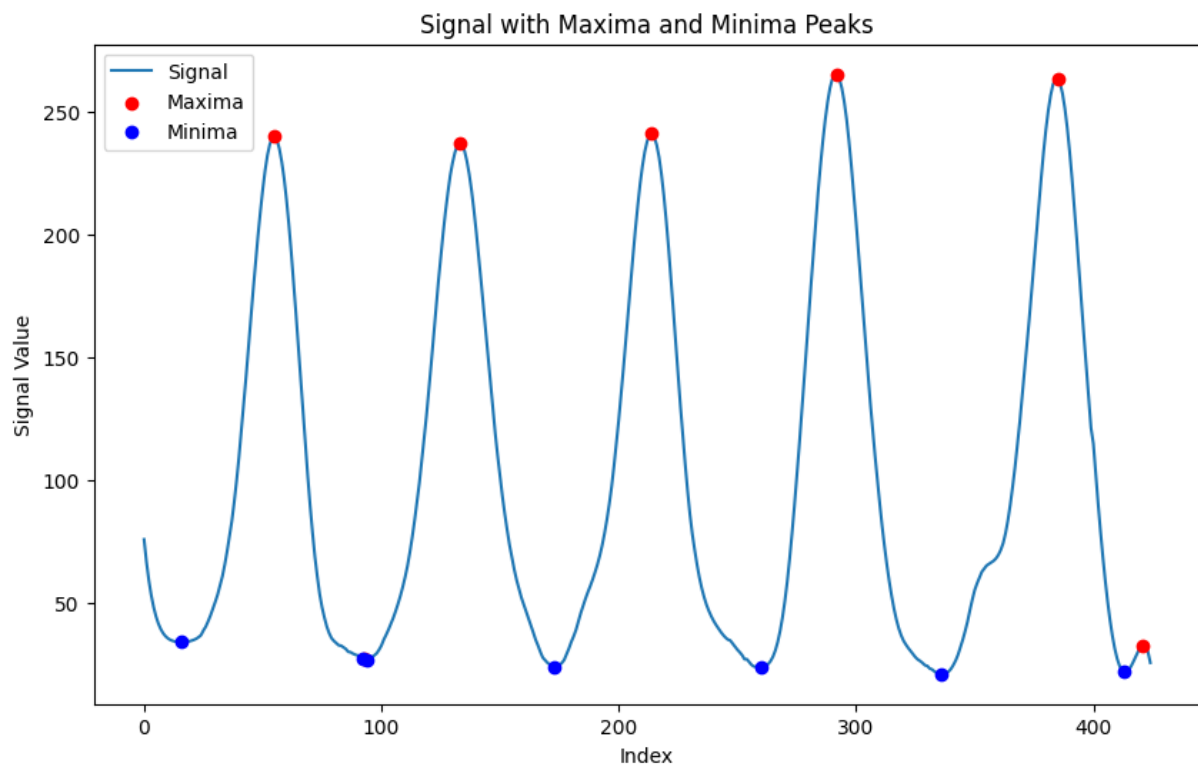
OUTPUT:

Signal with Maxima and Minima Peaks

C CODE:

DATA 1:

```c
#include <stdio.h>

void find_peaks(double data[], int n, int maxima[], int *max_count, int
minima[], int  *min_count) {

 *max_count = 0;

 *min_count = 0;

 for (int i = 1; i < n - 1; i++) {

 if (data[i - 1] < data[i] && data[i] > data[i + 1]) {

 maxima[(*max_count)++] = i;

 }

 if (data[i - 1] > data[i] && data[i] < data[i + 1]) {

 minima[(*min_count)++] = i;

 }

 }

}

int main() {

 FILE *file = fopen("Data_1.txt", "r");

 if (file == NULL) {

 printf("Failed to open file\n");

 return 1;

 }

 double data[1000];

 int n = 0;

 while (fscanf(file, "%lf", &data[n]) != EOF) {

 n++;

 }
```

```c
    fclose(file);

    int maxima[1000], minima[1000];

    int max_count, min_count;

    find_peaks(data, n, maxima, &max_count, minima, &min_count);

    printf("Maxima indices:\n");

    for (int i = 0; i < max_count; i++) {

    printf("%d ", maxima[i]);

    }

    printf("\nMinima indices:\n");

    for (int i = 0; i < min_count; i++) {

    printf("%d ", minima[i]);

    }

    printf("\n");

    return 0;

}
```
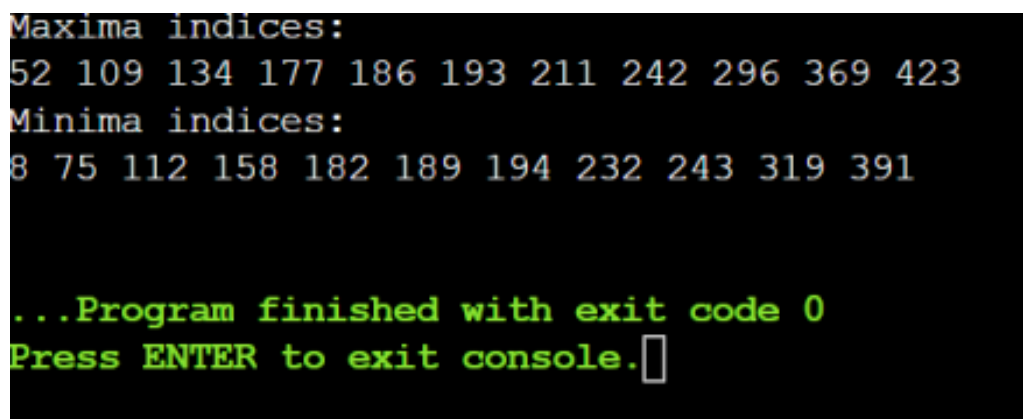
OUTPUT:

```
Maxima indices:
52 109 134 177 186 193 211 242 296 369 423
Minima indices:
8 75 112 158 182 189 194 232 243 319 391


...Program finished with exit code 0
Press ENTER to exit console.
```

DATA 2:

```c
#include <stdio.h>

void find_peaks(double data[], int n, int maxima[], int *max_count, int minima[], int  *min_count) {
```

```c
    *max_count = 0;

    *min_count = 0;

    for (int i = 1; i < n - 1; i++) {

    if (data[i - 1] < data[i] && data[i] > data[i + 1]) {

    maxima[(*max_count)++] = i;

    }

    if (data[i - 1] > data[i] && data[i] < data[i + 1]) {

    minima[(*min_count)++] = i;

    }

    }

}

int main() {

 FILE *file = fopen("Data_2.txt", "r");

 if (file == NULL) {

 printf("Failed to open file\n");

 return 1;

 }

 double data[1000];

 int n = 0;

 while (fscanf(file, "%lf", &data[n]) != EOF) {

 n++;

 }

 fclose(file);

 int maxima[1000], minima[1000];

 int max_count, min_count;

 find_peaks(data, n, maxima, &max_count, minima,
&min_count);  printf("Maxima indices:\n");

 for (int i = 0; i < max_count; i++) {
```
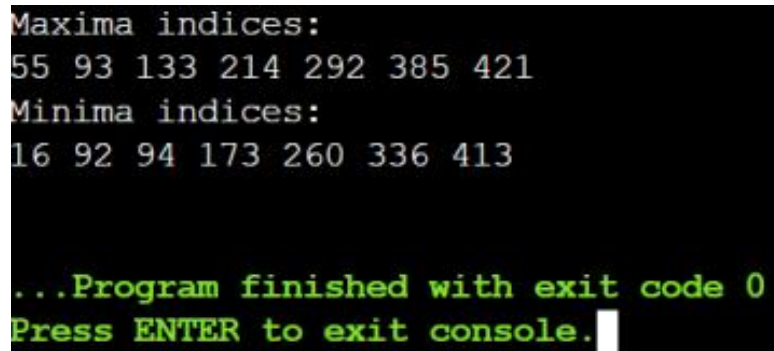
```c
        printf("%d ", maxima[i]);

    }

    printf("\nMinima indices:\n");

    for (int i = 0; i < min_count; i++) {

    printf("%d ", minima[i]);

    }

    printf("\n");

     return 0;

    }
```

OUTPUT:

```
Maxima indices:
55 93 133 214 292 385 421
Minima indices:
16 92 94 173 260 336 413




...Program finished with exit code 0
Press ENTER to exit console.
```