Programming Project 11

A Magic Square is a grid with 3 rows and 3 columns with the following properties:

- *The grid contains every number from 1 to 9.*
- *The sum of each row, each column, and each diagonal all add up to the same number.*

This is an example of a Magic Square:

4 9 2

3 5 7

8 1 6

In Python, you can simulate a 3x3 grid using a two-dimensional list. For example, the list corresponding to the grid above would be:

`[[4, 9, 2], [3, 5, 7], [8, 1, 6]]`

Write the definition of a function named `is_magic_square` that accepts a two-dimensional list as an argument and returns either `True` or `False` to indicate whether the list is a Magic Square. (Submit only the function definition, not a complete program.)

Answer

```
def is_magic_square(square):
  # Check if all numbers from 1 to 9 are present
  if sorted([num for row in square for num in row]) != list(range(1, 10)):
    return False

  # Calculate the magic constant (sum of a row, column, or diagonal)
  magic_constant = sum(square[0])

  # Check rows and columns
  for i in range(3):
    if sum(square[i]) != magic_constant or sum([row[i] for row in square]) != magic_constant:
        return False
```

```
  # Check diagonals
  if square[0][0] + square[1][1] + square[2][2] != magic_constant or square[0][2] + square[1][1] +
square[2][0] != magic_constant:
    return False

  return True
```