Simple Boolean logic operations. Assume we have four input data samples {(0, 0), (0, 1), (1, 0), (1, 1)} to a model. Perform the followings in Python:

Input Data

```
input_data = [(0, 0), (0, 1), (1, 0), (1, 1)]
```

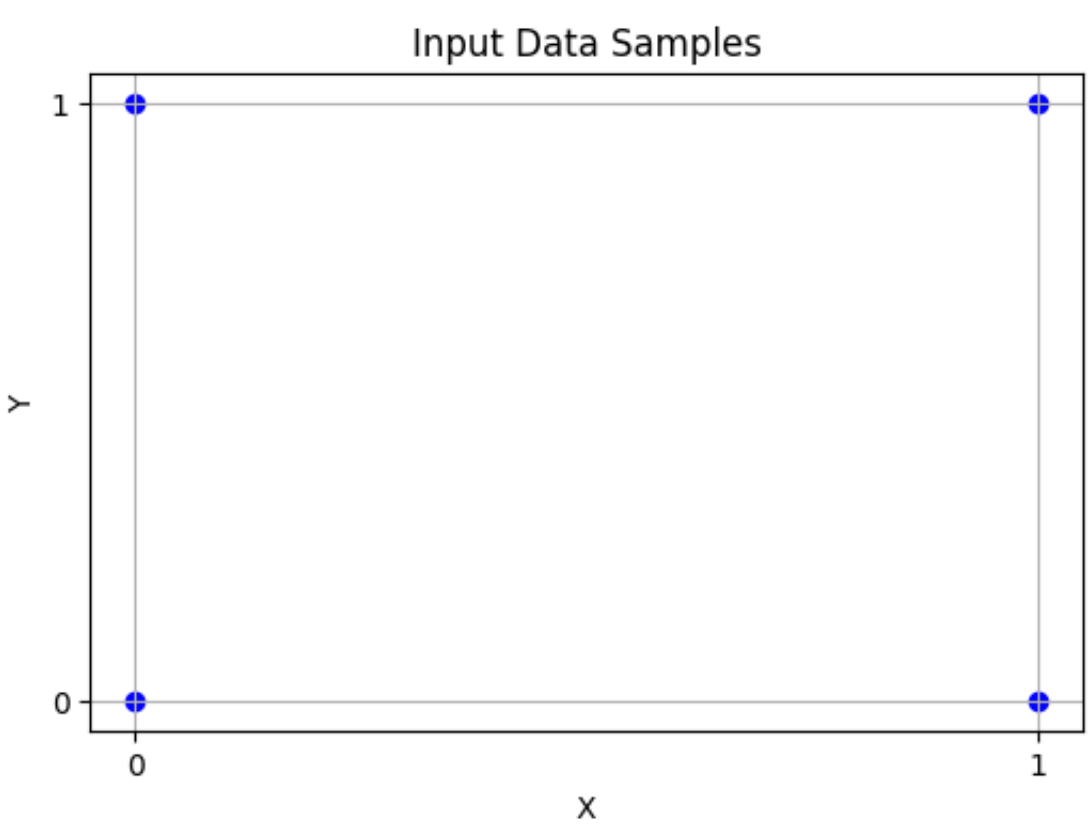
Imports

```
import matplotlib.pyplot as plt
```

1. Plot the four input data samples. Label the axes and title as appropriate.

```
x_values = [x[0] for x in input_data]
y_values = [x[1] for x in input_data]
```

```
plt.figure(figsize=(6, 4))
plt.scatter(x_values, y_values, color='blue', marker='o')
plt.xlabel('X')
plt.ylabel('Y')
plt.title('Input Data Samples')
plt.grid(True)
plt.xticks([0, 1])
plt.yticks([0, 1])
plt.show()
```



2. Write a function that takes two arguments as an input and performs AND operation. The function returns the result to the main program.

```
def and_operation(x, y):
    if x:
        return y
    return False
```

```
test_result = and_operation(1, 0)

test_result
```

```
0
```

3. Write two additional functions like in part (b); each would perform OR and XOR operations and return the result to the main program.

```
def or_operation(x, y):
    if x:
        return True
    return y


def xor_operation(x, y):
    if x:
        return not y
    return y


test_or_result = or_operation(1, 0)
test_xor_result = xor_operation(1, 0)

test_or_result, test_xor_result
```

```
(True, True)
```

4. Create a for loop to call the three functions each for data sample each time.

```
and_results = []
or_results = []
xor_results = []

for x, y in input_data:
    and_results.append(and_operation(x, y))
    or_results.append(or_operation(x, y))
    xor_results.append(xor_operation(x, y))

print("AND operation results:", and_results)
print("OR operation results:", or_results)
print("XOR operation results:", xor_results)
```

```
AND operation results: [False, False, 0, 1]
OR operation results: [0, 1, True, True]
XOR operation results: [0, 1, True, False]
```

5. Store the output of each function in a separate list/array.

```
print("Test:")
print("------------------------------")
print("Data Sample\tAND\tOR\tXOR")
for i in range(len(input_data)):
    print(f"{input_data[i]}\t\t{and_results[i]}\t{or_results[i]}\t{xor_results[i]}
```

```
Test:
------------------------------
Data Sample     AND     OR      XOR
(0, 0)          False   0       0
(0, 1)          False   1       1
(1, 0)          0       True    True
(1, 1)          1       True    False
```

6. Print out the results for the three functions at the end of your program.

```
print("Results:")
print("-----------------------------------")
print("AND operation results:", and_results)
print("OR operation results:", or_results)
print("XOR operation results:", xor_results)
```

```
Results:
-----------------------------------
AND operation results: [False, False, 0, 1]
OR operation results: [0, 1, True, True]
XOR operation results: [0, 1, True, False]
```

Colab Link: https://colab.research.google.com/drive/1BdLxtiVUv6u3GNK8YGuMXjm3LeEHOtc2?usp=sharing