QWorld Global QBronze Workshop | Homework Day 1

❓ 20/20 إجمالي النقاط

عنوان البريد الإلكتروني *

m.saber87@hotmail.com

* Name, Surname

Mohamed Saber Ahmad

Questions

2/2 Which ones of the following operators are not reversible? (Select all that applies) ✓

✓	ZERO ☑
✓	ONE ☑
	NOT ☐
	I ☐

1/1 ?What is the dimension of the vector representing a system with 4 coins ✓

	4 ○
	8 ○
	40 ○
✓	16 ◉

2/2 You are given a classical biased coin with probability of heads 0.4 and probability of tails 0.6. The coin is flipped for 1000 times. What is the most likely outcome? ✓

✓	Heads: 402 Tails: 598 ◉
	Heads: 320 Tails: 680 ○
	Heads: 603 Tails: 397 ○
	Heads: 500 Tails: 500 ○

2/2 Check the ones which are true for probabilistic operators. ✓

✓	Column sum adds up to 1 ☑
✓	All entries are real ☑
	Row sum adds up to 1 ☐
✓	All entries are non-negative ☑
	All entries should be positive ☐

```
heads = tails = 0
for i in range(1000):
    if randrange(100) <x:
        heads = heads + 1
    else:
        tails = tails + 1
```

1/1   If we want to simulate a biased coin with probability of heads=0.3, what should be the value of x? ✓

✓	30

2/2   Given a probabilistic system with states {1,2,3,4} and operator A , what is the probability of observing state 1 if we are initially in state 4? ✓

$$A = \begin{pmatrix} 0.1 & 0.2 & 0.3 & 0.4 \\ 0.9 & 0 & 0 & 0 \\ 0 & 0.8 & 0 & 0 \\ 0 & 0 & 0.7 & 0.6 \end{pmatrix}.$$

✓	0.4

2/2   If we have two probabilistic bits represented by the following vectors, what is the probability of observing state [01]? ✓

$$\begin{bmatrix} 0.2 \\ 0.8 \end{bmatrix} \begin{bmatrix} 0.9 \\ 0.1 \end{bmatrix}$$

✓	0.02

```
q = QuantumRegister(1)
c = ClassicalRegister(1)
qc = QuantumCircuit(q,c)

#Your code here

qc.measure(q[0],c[0])
job = execute(qc,Aer.get_backend('qasm_simulator'),shots=1024)
counts = job.result().get_counts(qc)
print(counts) # counts is a dictionary
```

1/1   We have a circuit with a single qubit created with the code given above. What should replace #Your code here if we want to apply a NOT operator to the qubit? ✓

✓	qc.x(q[0])

2/2   What will the output of the above code after #Your code here is replaced? ✓

✓	{'1': 1024} ◉
	{'0': 1024} ○
	{'1': 502, '0': 522} ○
	{'11': 1024} ○

```
q2 = QuantumRegister(2,"qreg")
c2 = ClassicalRegister(2,"creg")
qc2 = QuantumCircuit(q2,c2)

qc2.x(q2[1])

qc2.measure(q2,c2)
job = execute(qc2,Aer.get_backend('qasm_simulator'),shots=100)
counts = job.result().get_counts(qc2)
print(counts) # counts is a dictionary
```

?What will be the output of the above code ✓

{'10': 1024} ◯

{'11': 100} ◯

✓ {'10': 100} ⦿

{'01': 100} ◯

Code

```
q3 = QuantumRegister(4,"qreg")
c3 = ClassicalRegister(4,"creg")
qc3 = QuantumCircuit(q3,c3)

#Your code here

qc3.measure(q3,c3)
job = execute(qc3,Aer.get_backend('qasm_simulator'),shots=x)
counts = job.result().get_counts(qc3)
print(counts) # counts is a dictionary
```

2/2 We have a circuit with 4 qubits. Suppose that after the measurement we ✓
have the following output: {'0010': 1024}. What should come to your#
code here ?

✓ qc3.x(q3[1])

1/1 ?Check the line containing 'shots=x'. What is the value of x ✓

✓ 1024