Homework 4 Results for SevdanurGenc

ⓘ Correct answers are hidden.

Score for this attempt: **20** out of 20

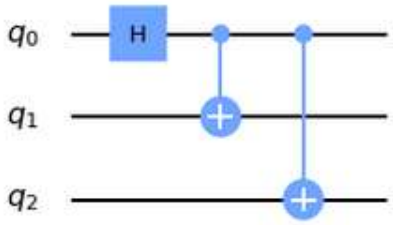
Submitted May 22 at 12:02am

This attempt took less than 1 minute.

Question 1

2 / 2 pts

[**Q72-06**] What can be an outcome if the following circuit is measured and simulated 1000 times?



- (●) {'000': 480, '111': 520}
- ( ) {'001': 490, '000': 502}
- ( ) {'000': 247, '001': 253, '010': 255, '111': 245}
- ( ) {'100': 501, '000': 499}

Question 2

2 / 2 pts

[**Q72-01**] Which states out of the following are entangled?

- [✓] $\frac{|00\rangle-|11\rangle}{\sqrt{2}}$
- [ ] $\frac{|0\rangle+|1\rangle}{\sqrt{2}}$
- [ ]

- [x] $\frac{|01\rangle-|10\rangle}{\sqrt{2}}$
- [ ] $\frac{|00\rangle+|01\rangle+|10\rangle+|11\rangle}{2}$

Question 3

2 / 2 pts

[**Q72-02**] Which statements are true about the following state: $\frac{|000\rangle+|001\rangle+|111\rangle}{\sqrt{3}}$ (Order: |first,second,third⟩)

- [x] When the first qubit is measured and the outcome is 0, then the second qubit will be also measured as 0 with probability 1.
- [x] When the first qubit is measured and the outcome is 1, then the third qubit will be also measured as 1 with probability 1.
- [ ] When the first qubit is measured and the outcome is 0, then the third qubit will be also measured as 1 with probability 1.
- [ ] By measuring the value of the second qubit, we can not decide the value of the first qubit.
- [ ] If we measure the first two qubits, then the third qubit will be alwayes measured as 1.

Question 4

2 / 2 pts

[**Q72-03**] Suppose that Asja want to send the message '1302' to Balvis using superdense coding. Asja will send the digits one by one: first 1, then 3, then 0 and finally 2 and she makes the following encoding: 0:00 1:01 2:10 3:11. Hence, to send 1302, she will send 8 bits of information. As you know, in

superdense coding we can send 2 bits at once, therefore she will use the protocol 4 times.

How many entangled pair of qubits do Asja and Balvis need in total?

- (●) 4 pairs (8 qubits), we need a different pair each time.
- ( ) 1 pair (2 qubits) is enough, we can use the same pair each time.
- ( ) 8 pairs (16 qubits), we need 2 pairs each time.
- ( ) We don't need entangled pair of qubits.

Question 5

2 / 2 pts

[**Q72-04**] Suppose that Asja want to send the message '1302' to Balvis using superdense coding. Asja will send the digits one by one: first 1, then 3, then 0 and finally 2 and she makes the following encoding: 0:00 1:01 2:10 3:11. Hence, to send 1302, she will send 8 bits of information. As you know, in superdense coding we can send 2 bits at once, therefore she will use the protocol 4 times.

To start with, Asja sends '01'. Which operations should she apply to her qubit?

- (●) Apply X
- ( ) Apply Z
- ( ) Apply X and Z
- ( ) Apply nothing

Question 6

2 / 2 pts

[**Q72-05**] Suppose that Asja want to send the message '1302' to Balvis using superdense coding. Asja will send the digits one by one: first 1, then 3, then

0 and finally 2 and she makes the following encoding: 0:00 1:01 2:10 3:11. Hence, to send 1302, she will send 8 bits of information. As you know, in superdense coding we can send 2 bits at once, therefore she will use the protocol 4 times.

Balvis has received the first qubit from Asja but he has lost his own qubit which was initially entangled with Asja's qubit. Is it possible for him to recover the message?

- (●) It is not possible to recover the message.
- ( ) He should create the copy of the qubit sent by Asia and then measure both.
- ( ) He should apply X to the qubit he has received and then measure to recover the message.
- ( ) He should apply H to the qubit he has received and then measure to recover the message.

Question 7

2 / 2 pts

[**Q76-01**] What will be the output of the following code?

```
q = QuantumRegister(2,"q")
c = ClassicalRegister(2,"c")
qc = QuantumCircuit(q,c)

qc.x(q[0])

qc.measure(q[0],c[0])

qc.h(q[1]).c_if(c,0)

qc.measure(q,c)
```

- (●) {'01': 1024}
- ( ) {'00': 1024}
- ( ) {'10': 502, '11': 522}

{'11': 1024}

Question 8

2 / 2 pts

[**Q76-02**] Mark the true statements.

- [x] In superdense coding we send 2 bits of information using 1 qubit.
- [ ] Faster than light communication is possible with entanglement.
- [ ] In superdense coding, operations applied by the receiver depends on the message to be send.
- [ ] There is only a single entangled state, namely $\frac{|00\rangle+|11\rangle}{\sqrt{2}}$.
- [ ] Using teleportation, we can create multiples copies of the same qubit.

Question 9

1 / 1 pts

[Q76-03] Asja teleports a state of a qubit to Balvis. In the following code, you see the post processing performed by Balvis at the end of the quantum teleportation protocol. If Asja tells him that she has measured '10', what is a?

```
# post-processing done by Balvis
qc.a(q[0])
```

z

Question 10

2 / 2 pts

[**Q76-04**] Asja is teleporting a quantum state to Balvis. Suppose that Asja makes the measurement and we use statevector simulator to get the current vector. All entries of the vector are 0 except the last 2. What can you conclude about the measurement result of Asja? (Assuming that qubits are in the same order as described in the notebook)

- (•) 11
- ( ) 00
- ( ) 01
- ( ) 10

Question 11

1 / 1 pts

[**Q76-05**] At the end of quantum teleportation protocol, how many qubits does Balvis have?

- (•) 1
- ( ) 2
- ( ) 3
- ( ) 0

Quiz Score: **20** out of 20