QClass 24/25 QKD Homework 4

Due Dec 23 at 3:59am   **Points** 10   **Questions** 10
Available Dec 16 at 1am - Dec 23 at 3:59am 7 days
Time Limit 60 Minutes   **Allowed Attempts** 3

Take the Quiz Again

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	19 minutes	6 out of 10

⚠ Answers will be shown after your last attempt

Score for this attempt: **6** out of 10
Submitted Dec 22 at 11:11pm
This attempt took 19 minutes.

Question 1	1 / 1 pts

The basis $\{|\,00>,|\,01>,|\,10>,|\,11>\}$ is a complete basis set for

○ 2 dimensional Hilbert space

○ 3 dimensional Hilbert space

◉ 4 dimensional Hilbert space

○ 1 dimensional Hilbert space

Question 2	1 / 1 pts

In E91 protocol Alice and Bob each use

◉ 3 bases

○ 4 bases

○ 2 bases

○ 1 basis

Incorrect

Question 3	0 / 1 pts

In E91 protocol Alice and Bob's basis choice do not match

Last Attempt Details:

Time:	19 minutes
Current Score:	6 out of 10
Kept Score:	6 out of 10

2 More Attempts available

Take the Quiz Again

(Will keep the highest of all your scores)

○ In 1/2 cases

○ In 7/9 cases

○ in 2/9 cases

◉ In 1/3 cases

Incorrect

Question 4

0 / 1 pts

In BBM92 protocol Alice prepares a Bell state and sends one qubit to Bob, After receiving all the qubits Alice and Bob measure the qubits in a randomly chosen basis {0,1} or {+,-}. They announce the bases and keep the bits where their bases match. The protocol can be modified to save resources by

◉ Not announcing the bases choice

○ always measuring in the same bases

○ None of the given choices

○

making a measurement before sending the other pair to Bob

Question 5

1 / 1 pts

Hidden variable theory is true if we have better experimental setup.

○ True

◉ False

Incorrect

Question 6

0 / 1 pts

For measurement of observable
$X, Z, W = \frac{1}{\sqrt{2}}(X + Z), V = \frac{1}{\sqrt{2}}(-X + Z)$ with each having two outcomes $+1$ or -1, and for state $|\phi^-\rangle = \frac{1}{\sqrt{2}}(|00\rangle - |11\rangle)$

$\langle X \otimes W \rangle = ?$

○ $\frac{1}{\sqrt{2}}$

○ $-\frac{1}{\sqrt{2}}$

◉ 0

○ 1

Question 7   **0 / 1 pts**

For measurement of observable
$X, Z, W = \frac{1}{\sqrt{2}}(X + Z), V = \frac{1}{\sqrt{2}}(-X + Z)$ with each having two
outcomes $+1$ or -1 and $S = \langle XW \rangle + \langle ZW \rangle - \langle XV \rangle + \langle Z$
$S = \pm 2$ implies

○ classical system

◉ quantum system

Question 8   **1 / 1 pts**

In E-91 protocol, if Asja and Balvis get the result $S < 2\sqrt{2}$
they conclude

○ They are secure to use the key.

◉ Espian has intercepted.

Question 9   **1 / 1 pts**

E-91 protocol has an advantage over BB84 as Asja and Balvis
can send actual message through this process.

○ True

◉ False

Question 10   **1 / 1 pts**

In E-91 protocol, if Espian intercepts a qubit, he can know
which bases Asja and Balvis use.

○ True

◉ False

Quiz Score: **6** out of 10