## Quiz- QPE, Order finding, Shor Results for Prateek Jain

## ! Correct answers are hidden.

Score for this attempt: **16** out of 20 Submitted May 24 at 4:08pm This attempt took 9 minutes.

Question 1	2 / 2 pts
Select the true statements.	
If $\phi$ is of the form $x/2^t$ , then it can calculated exactly by using $t$ qubits in first register.	n the
All eigenvalues of a unitary operator have norm 1.	
QPE algorithm only works for single-qubit operators U.	
☐ The aim of QPE algorithm is to estimate the eigenvector of an operator	or.

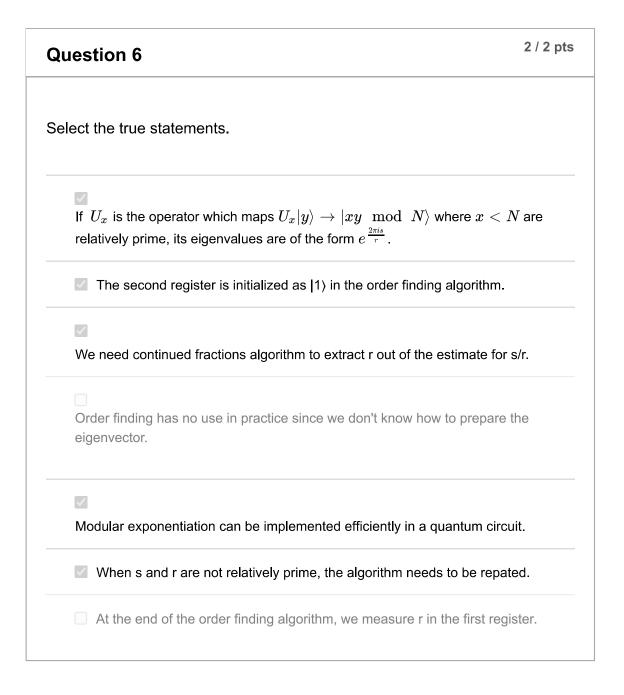
Question 2	2 / 2 pts
If $\phi=3/16$ and the first register contains 3 qubits, which states do expect to observe more frequently?	you
○  011⟩ and  100⟩	
○  011⟩ and  111⟩	
○  O11⟩	

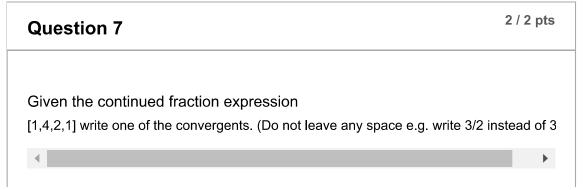
Question 3	2 / 2 pts
How do you initialize the second register in QPE?	
We leave qubits in the second register in 0 state.	
<ul> <li>We apply H to each qubit in the second register.</li> </ul>	
It is initialized as the eigenvector of the operator U.	
○ We apply X and H to each qubit in the second register.	

Question 4	2 / 2 pts
Select the eigenvectors and the corresponding eigenvalues of the Z	operator.
✓  1) with eigenvalue -1	
☐  -⟩ with eigenvalue 1	
+⟩ with eigenvalue -1	
✓  0⟩ with eigenvalue 1	
□  0⟩ with eigenvalue -1	

Question 5	2 / 2 pts
Let x=4 and N=81. What is r ? (You can compute in Python)	

27





5/4

Question 8

2 / 2 pts

Select the true statements.

It is proven that no classical algorithm solves the factoriazation problem in polynomial time.

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The main advantage of Shor's algorithm is the ability to compute r efficiently.

If r is not even, then one should pick a new x and repeat the algorithm.

Shor's algorithm provides quadratic speedup compared to the best known classical algorithm.

Incorrect

**Question 9** 

0 / 2 pts

If the quantum state before applying the inverse QFT is the the following state,

$$\tfrac{1}{\sqrt{2^9}}\big(|0\rangle|1\rangle+|1\rangle|3\rangle+|2\rangle|9\rangle+|3\rangle|7\rangle+|4\rangle|1\rangle+|5\rangle|3\rangle+|6\rangle|9\rangle+\ldots+|2$$

what is r?

4

9

Incorrect

Question 10 0 / 2 pts

If at the end of the Shor's algorithm, the probability of observing state  $|k\rangle$  is given by  $\left|\frac{1}{\sqrt{85\cdot512}}\sum_{x=0}^{84}e^{-\frac{2\pi i(6x+2)k}{512}}\right|^2$ , write down a state (except 0 and 256) which is likely to be observed with high probability. (Write it as a decimal number, e.g. 34)

1024

Quiz Score: 16 out of 20