Feedback for Problem Sheet 1

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Question 1

This question was answered well by most if not all students. The toughest part was explaining “why?”, indeed many students seem to have overlooked it entirely

Question 2

Parts a and b were answered well by most students, with the most common error being getting the coefficients the wrong way around in Dirac form. Part c was trickier, with many students feeling the need to derive |+> and |-> as the eigenstates of X first. Also, some students only did one calculation out of the two required, although it wasn’t clear if they were unsure how to do the other way, or simply missed it

Question 3

This question was answered with minimal errors by all who attempted it, the only real errors came from misreading the question and not doing what it asked of them

Question 4

This was the hardest question on the sheet. A majority of students knew how to prove orthonormality, but not all managed it, with forgetting to conjugate the coefficients of the bra, and not knowing/deriving ω^2+ω+1=0 being the most common stumbling points. Some students verified orthogonality, but neglected to check normalisation, or vice versa. Others missed out on verifying orthogonality entirely, but this may have been a misreading of the question. Finding the matrix M proved straightforward for most, but few deduced it was unitary and even fewer did so without checking by calculation.

Question 5

This question was answered well by most students. Common errors included getting W and W^† the wrong way around, calculating T as (W^†)W instead of W(W^†), and arithmetic errors leading to confusion.