

Weekly Problem Set #7 – Week 8

PLEASE SHOW ALL YOUR WORK FOR FULL CREDIT. Showing your work includes writing out intermediate steps in ways that others can understand or writing sentences that help to communicate your assumptions and logic. If you utilize any software tools or apps (e.g. Mathematica, Desmos, ChatGTP, etc.), you must transparently acknowledge your use of them in your HW submission. A subset of these problems will be graded for correctness. The rest of the problems will be graded for effort.

Part 0: Quantum Error Correction (Wong Section 4.7)

Question 1 (5 pts). (Wong E4.35, Bit flip code).

Show your work.

Question 2 (8 pts). (Wong E4.36, Bit flip parity calculations & corrections).

Show your work.

Question 3 (5 pts). (Wong E4.37, Phase flip code).

Show your work.

Question 4 (6 pts). (Wong E4.38, Phase flip correction circuit).

Show your work.

Question 5 (4 pts). (Wong E4.39, on Equivalent circuits).

Show your work.

Question 6 (8 pts). (Wong E4.40, on Probability of particular parity outcomes for a given input state). Show your work.

Question 7 (6 pts). (Wong E4.41, Shor Code, which combines bit flip and phase flip code).

Show your work.