

Instructions: You cannot use any books or notes. You can use a calculator (not on your phone), but not a computer. You are not allowed to communicate with anyone (verbally, in writing, or electronically), except for me, during the exam period (and at most I will clarify a problem — I won't give you any help with solving the problems).

The exam consists of 4 problems, having a total of 5 parts. Each of the 5 parts is worth 25 points, and I'll sum your best 4 of 5 scores from these parts to determine your overall exam score.

Express probabilities as exact values (as fractions, or in decimal form), or else round them to three significant digits. (Note: 0.00402 has three significant digits, and 0.004 only has one significant digit.) In order to receive full credit, do not express final answers as expressions that need to be evaluated. (So a final answer should not include a binomial coefficient or even a factorial.)

Be sure to *use notation and terminology properly!* For most of the parts which follow, I want you to *define events* (if they aren't already defined in the statement of the problem). (If a part can be solved by mostly just using Ch. 2 results, you don't necessarily have to define events, but when using Ch. 3 results you should define events.) Put all of your work on these sheets. If you need more room, direct me to look for additional work on the back of a page. For all parts, *provide clear justification for your answer.* **Draw boxes around your final answers!**