Exam C is scheduled for Monday November 25, 8:30 AM – 11:00 AM, in our usual room. It should be about the same length as Exam A and Exam B, or maybe one page longer. I reserve the right to ask questions about the earlier parts of the course. In fact, I'm planning to ask one or two such questions. But mostly the exam will be focused on recent material, that wasn't tested on Exam A or Exam B.

You are permitted, but not required, to bring a crib sheet of notes. Here are the rules.

- You must write/draw/type the sheet yourself. (The intent of this rule is for you to incur the educational value of making the sheet.)
- It's one standard (8.5 x 11 inches, A4, or smaller) sheet of paper. You may use both sides. It must be on paper, not an electronic device. (The intent of this rule is for you not to have a huge amount of material, such as an entire book, or a large object, such as a poster.)
- No sharing sheets during the exam. (The intent of this rule is to prevent communication among students.)

Follow not just the rules but also their intents. When in doubt about whether something is allowed, ask me. :)

After classes end, I will not have my usual office hours. Instead I will have these: Thursday, Friday, Sunday, 1:00–3:00.

See the back side of this sheet, for some review problems.

A. Suppose that an $n \times n$ matrix A has eigenvalues $\lambda_1, \lambda_2, \ldots, \lambda_n$ with corresponding eigenvectors $\vec{v}_1, \vec{v}_2, \ldots, \vec{v}_n$. Suppose also that k is a scalar. What, then, are the eigenvalues and eigenvectors of kA?

B. Section 5.6 #17ab. The state vector $\vec{x}$ will be two-dimensional, with one entry for the number of juvenile females and one entry for the number of adult females. Once you have a transition matrix A, consider computing the eigensystem of $10A$ rather than A itself.

C. Section 5.9 #25. You may recognize that there is a shortcut to the answer, but I want to see all of the linear-algebraic work. Consider computing the eigensystem of $20A$ rather than A itself.

D. Section 7.1 #23.

E. Compute the SVD of

$$A = \begin{bmatrix} 1 & 1 \\ 2 & 0 \\ 0 & -1 \\ 1 & 1 \end{bmatrix}.$$

G.A. Suppose that I give you a 2×3 matrix A and ask you: "How many of its singular values are positive?" For that hypothetical question, what are the possible answers? For each possible answer, give an explicit example of an A with that answer. And what if A is 3×2 instead?

G.B. Suppose that A is an invertible $n \times n$ matrix. What can you tell me about its SVD?

H. For principal component analysis, practice calculations such as those on the Day 27 homework.