18.06 Problem Set 8

Due Wednesday, April 25, 2007 at **4:00 p.m.** in 2-106

Problem 1 *Wednesday 4/18*

Do problem 5 of section 6.3 in your book.

Problem 2 *Wednesday 4/18*

Do problem 11 of section 6.3 in your book.

Problem 3 *Wednesday 4/18*

Let

$$A = \begin{bmatrix} 0 & 1 & 2 & 3 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}.$$

(a) What are the eigenvalues of A?
(b) How many linearly independent eigenvectors does A have? Find them.
(c) Find e^{At}.
(d) Find the solution to the differential equation $\frac{du}{dt} = Au$ when $u(0) = \begin{bmatrix} 1 & 1 & 1 & 1 \end{bmatrix}^T$.

Problem 4 *Friday 4/20*

Do problem 9 of section 6.4 in your book.

Problem 5 *Friday 4/20*

Do problem 16 of section 6.4 in your book.

Problem 6 *Friday 4/20*

Do problem 18 of section 6.4 in your book.

Problem 7 *Friday 4/20*

Do problem 27 of section 6.4 in your book.

Problem 8 *Monday 4/23*

Do problem 4 of section 6.5 in your book.

Problem 9 *Monday 4/23*

Do problem 19 of section 6.5 in your book.

Problem 10 *Monday 4/23*

Let A be any 3×3 symmetric matrix. Is it true that for large enough t, $A + tI$ is positive definite?