

# MATH 54 Homework 9

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Due Thursday, August 2.

- Hill 5.4: 3, 9, 21.
- Let  $A$  be a skew-symmetric matrix with real entries. Prove that all the eigenvalues of  $A$  are purely imaginary.
- Let  $g_0 = 0$ ,  $g_1 = 1$ , and

$$g_{n+2} = g_{n+1} + 2g_n$$

for all  $n \geq 0$ . Give a formula for  $g_n$  and compute

$$\lim_{n \rightarrow \infty} \frac{g_{n+1}}{g_n}.$$

- Put the following matrices into Jordan canonical form. That is, give matrices  $S$  and  $J$  for each matrix such that  $J$  is in Jordan canonical form and the original matrix is equal to  $SJS^{-1}$ .

1.  $\begin{pmatrix} 1/3 & 4/3 \\ -1/3 & 5/3 \end{pmatrix}$

2.  $\begin{pmatrix} -1 & -1 & 0 \\ -1 & -1 & -2 \\ 1 & 1 & 1 \end{pmatrix}$

3.  $\begin{pmatrix} 1/2 & 1/2 & 3/2 \\ -1/2 & -1/2 & -3/2 \\ 0 & 0 & 0 \end{pmatrix}$

4.  $\begin{pmatrix} 2 & -1 & 4 \\ -2 & 0 & -3 \\ -3 & 1 & -5 \end{pmatrix}$