Math 227 Exam 3 Winter 13 Solutions

1) (2 points each)

2)

a) Do it.

b) $\begin{bmatrix} 3^k & k3^k \\ 3^{k+1} & (k+1)3^{k+1} \end{bmatrix}$

c) For $k = 0$, we have $\begin{bmatrix} 1 & 0 \\ 3 & 3 \end{bmatrix}$, which has determinant 3 and so is invertible. Therefore (x_k) and (z_k) are linearly independent. Since the solution space has dimension 2, the set is a basis.

3) $\dfrac{800}{4049} \approx .19757$

4) a) $\lambda_1 = 2$, $v_1 = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$; $\lambda_2 = 8$, $v_2 = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$

b) $\|A\| = 8$.

c) It is it's own polar decomposition! (This happens for all positive semi-definite matrices.)

5) $\lambda = 0$ is the only eigenvalue.