UNLV
UNIVERSITY OF NEVADA LAS VEGAS

EE474/ECG695: Linear Systems

Spring 2008, 3 credits: Test 3

Dr. Pushkin Kachroo
http://www.ece.vt.edu/pushkin
pushkin@unlv.edu

PROBLEM 1 : (5 points) Prove that all similar matrices have the same eigenvalues.

PROBLEM 2 : (5 points) Given matrix

$$A = \begin{pmatrix} 3 & 2 \\ 2 & 3 \end{pmatrix}$$

use Cayley-Hamilton theorem to compute A^2.

PROBLEM 3 : (5 points) For the general scalar time varying linear differential system $dx/dt = \alpha(t)x$, find the scalar transition matrix.

PROBLEM 4 : (5 points) Let $\Phi(t, \tau)$ be the transition matrix for the autonomous system $dx/dt = A(t)x$, find the solution for the system $dx/dt = A(t)x + B(t)u$.

PROBLEM 5 : (10 points) State and prove the rank condition for total controllability for the LTI system $dx/dt = Ax + Bu$.

PROBLEM 6 : (10 points) State and prove the separation principle for LTI systems.