King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
Math 590 , Term: 111
Instructor: Dr. Faisal Fairag; Dr. Hattan Tawfiq

HOMEWORK – 3
Due Monday 10 October, 2011

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1) Let x,y be nonzero vectors in R^n such that $\|x\|_2 = \|y\|_2$. Show that there is a Householder reflector $U = I_n - 2vv^T / v^T v, v \neq 0$ such that Ux=y.

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2) For $A \in R^{n\times n}$ develop an algorithm that produces Householder reflectors $U_1,....,U_{n-1}$ such that $U_{n-1}...U_1 A = L$ is lower triangle.

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3) Factor $A = \begin{bmatrix} 2 & 4 \\ 3 & 5 \\ 1 & 6 \end{bmatrix}$
into a product QR where Q is an orthogonal and R is an upper triangle.

(a) by using Householder.
(b) by using Gram– Schmidt.
(c) by using given transformation.
(d) by using qr Matlab command.
(e) discuss your result in (a), (b), (c) and (d).
