ECH3301   Process Analysis and Design   9/1/10
Quiz 1   Name _____

This is an open book and open note quizz. You may use any notes or supporting material you like.

1. Simplify: $e^{-2\ln x} =$

2. $\frac{d}{dx}\left(\sqrt{x} + \frac{x+1}{x^2+1}\right) =$

3. $\int \frac{dx}{x^2-9} =$

4. Matrix multiplication corresponds to the composition of linear functions.

   If functions $f\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} ax_1 + bx_2 \\ cx_1 + dx_2 \end{pmatrix}$ and $g\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} Ax_1 + Bx_2 \\ Cx_1 + Dx_2 \end{pmatrix}$, what is $h = f \circ g$?

   If matrices $F = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and $G = \begin{bmatrix} A & B \\ C & D \end{bmatrix}$, what is $H = F \cdot G$?

   Note: $f \circ g = f(g(\mathbf{x}))$

5. Use partial pivoting (row exchanges to maximize magnitudes of pivots) on $A = \begin{bmatrix} 1 & 2 & -3 & 4 \\ 4 & 8 & 12 & -8 \\ 2 & 3 & 2 & 1 \\ -3 & -1 & 1 & -4 \end{bmatrix}$ and determine the LU decomposition $PA = LU$, where P is the associated permutation matrix.