Problems PreCal 1508 PLTL Workshop, October 19, 2011
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Please do the problems that you feel will help your group the most first (you don't have to do them in order). All handouts are available at `http://alex.knaust.info/pltlfall2011/`

1. Perform partial fraction decomposition.

$$\frac{x^2 + 2x + 3}{x^3 + x}$$

2. Perform the following operations on the matricies (if possible)

$$A = \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 6 \\ -4 & 2 & -3 \end{bmatrix} \qquad B = \begin{bmatrix} 2 & 1 \\ 1 & 4 \\ 0 & 3 \end{bmatrix}$$

a) $2A + B$ b) AB c) BA d) A^2

3. Solve the following system of equations using Gauß-Jordan elimination

$$\begin{cases} -x + y - z = -5 \\ 4y + 2z = 0 \\ x + 2y - 3z = -28 \end{cases}$$

4. Perform the following operations on the matricies (vectors).

$$A = \begin{pmatrix} 1 & 2 & 3 \end{pmatrix} \qquad B = \begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix}$$

a) $A \cdot B$ b) $B \cdot A$

5. Are the following true or false? Explain/give a counterexample.
   (a) For all matricies $A \cdot B = B \cdot A$
   (b) For all matricies $A + B = B + A$
   (c) For all matricies $A \cdot I = I \cdot A = A$. Where I is the Identity matrix (1's on the diagonal, 0's elsewhere)

6. For which class of matrices, A is $A \cdot B = B \cdot A$ (for any B) true?

   Notation 1. *Linear systems are often written as $A \cdot x = b$ where b is a known vector, and x is a vector of unknowns to be solved for, and the elements of A are the coefficients of $x_1, x_2, \ldots$.*

7. Write the system of equations presented in problem 3 in this form. How could you solve this if you knew A^{-1}?