Problems PreCal 1508 PLTL Workshop, October 19, 2011
PLs: Alex Knaust, Edith Mejia. Lecturer: Yi-Yu Liao

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. Show that the following is true by combining the fractions on the left hand side.

$$\frac{1}{x+1}+\frac{3}{x+2}-\frac{2}{(x+2)^2}=\frac{4x^2+11x+8}{(x+1)(x+2)^2}$$

2. Write the form of the partial fraction decomposition for the following rational functions (do not solve for constants $A, B, ...$)

a) $\frac{x+4}{x^2(3x-1)^2}$ b) $\frac{x^2}{x^4-2x^2-8}$ c) $\frac{x^4+2x^3+4x^2+8x+2}{x^3+2x^2+x}$

3. Write the partial fraction decomposition for the following rational functions (solve for constants)

a) $\frac{3}{x^4+x}$ b) $\frac{x^2-4x+7}{(x+1)(x^2-2x+3)}$ c) $\frac{x^2-4x}{x^2+x+6}$

4. Perform either Gaussian Elimination with back-substitution or Gauß-Jordan elimination.

a) $\begin{cases} -x+y=4 \\ 2x-4y=-34 \end{cases}$ b) $\left[\begin{array}{ccc|c} 1 & 0 & -3 & -2 \\ 3 & 1 & -2 & 5 \\ 2 & 2 & 1 & 4 \end{array}\right]$ c) $\begin{cases} 3x+-2y+z=15 \\ -x+y+2z=-10 \\ x-y-4z=14 \end{cases}$

5. Swapping rows in an augmented matrix will not alter the solutions. True or False?

6. Describe the difference between a matrix in row-echelon form and a matrix in reduced-row-echelon form, give examples of matricies in both forms.

7. A polynomial, f, of degree 3 goes through the following points

$$(-1,-5),(1,-1),(2,1),(3,11)$$

Find the function $f(x)$.

8. My peer leader told me that I can also do an analogue of partial fraction decomposition for rational numbers, using their prime factors as the denominators of the partial fractions, i.e.

$$\frac{1}{18}=\frac{1}{2\cdot 3^2}=\frac{A}{2}+\frac{B}{3}+\frac{C}{3^2}$$

Here he meant a fraction to be proper if the numerator is less than the denominator.

(a) What is a potential decomposition of $\frac{4}{30}$
(b) Do you think he is right (Is this always possible)?
(c) Is the decomposition unique if there is one?

9. When is a polynomial irreducible? Can you apply the same concept to say when an integer is irreducible?