Section 7.4

Decomposition of $N(x)/D(x)$ Into Partial Fractions

a) If $\deg\big(N(x)\big) \geq \deg\big(D(x)\big)$, try long division and then use the method of partial fractions on the remainder.

b) Completely factor the denominator into factors of the form

$$(px+q)^m \quad \text{and} \quad (ax^2+bx+c)^n$$

where $(ax^2+bx+c)^n$ is irreducible.

c) For each factor of the form $(px+q)^m$, the partial fraction decomposition must include the following sum of m fractions.

$$\frac{A_1}{(px+q)} + \frac{A_2}{(px+q)^2} + \cdots + \frac{A_m}{(px+q)^m}.$$

d) For each factor of the form $(ax^2+bx+c)^n$, the partial fraction decomposition must include the following sum of n fractions.

$$\frac{B_1x+C_1}{(ax^2+bx+c)} + \frac{B_2x+C_2}{(ax^2+bx+c)^2} + \cdots + \frac{B_nx+C_n}{(ax^2+bx+c)^n}.$$

Problem 1. Write the partial fraction decomposition of the rational expression.

a) $\frac{1}{9x^2-16}$

b) $\frac{-2x-2}{x^2-6x+8}$

c) $\frac{x}{(x-1)(x^2+x+1)}$

d) $\frac{2+x}{x^2-2x+1}$

e) $\frac{x^2-x+1}{(x^2+1)^2}$

Homework: Read section 7.4, do #9, 15, 21, 31, 45