MATH 213 - Tutorial 5: Midterm Review

1. (Easy) Find an expression for the PF decomposition of any function of the form

$$f_n(s) = \frac{1}{(s+1)(s+2)\cdots(s+n)}$$

for $n \geq 1$. You must explicitly find expressions for all the coefficients.

2. (Medium [hard if you don't use nice tricks]) Find the zero-state solution to

$$y^{(4)} + 2y'' + y = \sin(2x).$$

You may leave your answer as a convolution of two functions of s.

3. (Easy) Compute the convolution of the vectors $\vec{x} = [1, 2, 3, 4]$ and $\vec{y} = [-1, 1]$

4. (Easy) Compute the convolution of $f(x) = x^2 u(x)$ with

$$g(x) = \begin{cases} 1 & 0 < x < 1 \\ 2 & 1 \leq x < 2 \\ 0 & else. \end{cases}$$

5. (easy) Determine if the function $f(x)$ with Laplace transform is bounded.

$$F(s) = \frac{s^5}{(s+2)(s^2+8s+33)(s+9)(s^2+1)}$$