Name (Last, First)

1. (8pts) Compute the Fourier series for[1]

$$f(x) = \begin{cases} x^2, & \text{if} \quad 0 < x < \pi \\ 0, & \text{if} \quad -\pi < x < 0 \end{cases}.$$

What is the value of the Fourier series at $x = \pi$?

[1] For your convenience, here is one of the integrals you need to compute :

$$\int x^2 \sin nx dx = -\frac{x^2 \cos nx}{n} + \frac{2x \sin nx}{n^2} + \frac{2 \cos nx}{n^3}.$$

2. (2pts) Compute the Fourier series for

$$g(x) = \begin{cases} x, & \text{if} \quad 0 < x < \pi \\ 0, & \text{if} \quad -\pi < x < 0 \end{cases} .$$

You can use the fact (without a proof) that $\frac{1}{2} \cdot \frac{df(x)}{dx} = g(x)$ where $f(x)$ is the function from Problem 1.[2]

[2] Actually, you should NOT use that because your function $f(x)$ is not continuous!!!