**Problem 1:** Integrate the following:

$$\int_0^\infty \frac{2x}{x^4+1}\, dx$$

**Problem 2:** Integrate the following:

$$\int_0^1 x \ln x \, dx$$

**Problem 3:** Integrate the following:

$$\int_{-\infty}^{\infty} xe^{-x^2}\, dx$$