Problem 1 (20 points): Compute the following integral using rational substitution:

\[ \int \frac{dx}{\sqrt{x^2 + 2x + 17}} \]
Problem 2 (20 points): Determine the finiteness of the following integral and explain why

1. \[ \int_{1/2}^{\infty} \frac{\sin x + x}{(x^2 + 1)^2} \, dx \]

2. \[ \int_{1/2}^{\infty} \frac{\sin x + x}{x^2 + 1} \, dx \]

3. \[ \int_{0}^{\infty} \frac{\sin x^2}{x^2} \, dx \]

4. \[ \int_{-\infty}^{\infty} \frac{\sin x}{x} \, dx \]

( For this one, you can merely state the finiteness. Do not need to give the reason. )