Provide both a clear and organized presentation and show all of your work. Evaluate the following integrals:

1. $\displaystyle \int \frac{x^4 - x^3 + x^2 - 4x - 1}{x^2 + x + 3} \, dx$

2. $\displaystyle \int \frac{3x^3 + 6x^2 + 6x + 5}{\left(x^2 + 3\right)\left(2x^2 + x + 1\right)} \, dx$