The following problems are extra problems for practicing integration by parts.

**Problem 1:** \( \int \cos^\alpha(x) \, dx = \frac{\cos^{\alpha-1}(x) \sin(x)}{\alpha} + \frac{\alpha-1}{\alpha} \int \cos^{\alpha-2}(x) \, dx \)

**Problem 2:** \( \int \cos^\alpha(\beta x) \, dx = \frac{\cos^{\alpha-1}(\beta x) \sin(\beta x)}{\alpha \beta} + \frac{\alpha-1}{\alpha} \int \cos^{\alpha-2}(\beta x) \, dx \)

**Problem 3:** \( \int x^\alpha \ln(x) \, dx = \frac{x^{\alpha+1}}{\alpha+1} \ln(x) - \frac{x^{\alpha+1}}{(\alpha+1)^2} + C \)

**Problem 4:** \( \int \arctan \left( \frac{1}{t} \right) \, dt \)