

### Practice Exercises for Lecture 3:

Compute the following integral using the “reduction formula” from class.

$$\int \sin^6(x) dx$$

Derive a reduction formula for  $\int \cos^n(x) dx$  and use it to evaluate

$$\int \cos^4(x) dx$$

Show that the identity

$$-\frac{1}{2} \ln\left(\frac{1 - \cos(x)}{1 + \cos(x)}\right) = \ln |\csc(x) - \cot(x)| = \ln |\tan(x/2)|$$

**Hint:** Recall that  $a \ln(x) = \ln(x^a)$ . Multiply numerator and denominator by  $1 + \cos(x)$ .

Compute the following integrals by trigonometric substitution

$$\begin{aligned} & \int \frac{1}{10+2x+x^2} dx \\ & \int \frac{1}{\sqrt{2-x-x^2}} dx \\ & \int \frac{\sqrt{x^2-1}}{x^2} dx \end{aligned}$$