

Brief solutions to selected problems in homework 12

1. Section 7.3: Solutions, common mistakes and corrections:

a.
$$\begin{aligned}\int \operatorname{sech} x \, dx &= \int \frac{1}{\cosh x} \, dx \\ &= \int \frac{\cosh x}{\cosh^2 x} \, dx \\ &= \int \frac{\cosh x}{1 + \sinh^2 x} \, dx \\ &= \tan^{-1}(\sinh x) + C\end{aligned}$$

b.
$$\begin{aligned}\int \operatorname{sech} x \, dx &= \int \frac{\operatorname{sech}^2 x}{\operatorname{sech} x} \, dx \\ &= \int \frac{\operatorname{sech}^2 x}{\sqrt{1 - \tanh^2 x}} \, dx \\ &= \sin^{-1}(\tanh x) + C\end{aligned}$$

Figure 1: Solution to Section 7.3, problem 37

$$\begin{aligned}
 & \int \tanh \frac{x}{7} dx \\
 &= \int \frac{\sinh \frac{x}{7}}{\cosh \frac{x}{7}} dx, \quad d \cosh \frac{x}{7} = \frac{1}{7} \sinh \frac{x}{7} dx \\
 &\stackrel{u = \cosh \frac{x}{7}}{=} \int \frac{1}{u} du \\
 &= 7 \ln |u| + C \quad (u = \cosh \frac{x}{7} > 0) \therefore = 7 \ln u + C \\
 &= 7 \ln \cosh \frac{x}{7} + C
 \end{aligned}$$

Figure 2: Solution to Section 7.3, problem 45