

**Read:** Chapters 4, 5, & 6

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**Homework 07**

Due date: 05 Apr 19

Work problems 3.6, 3.7, 3.10, 3.11, 4.1, 4.4, 4.5, 4.6, 5.2, 5.3, 5.4 in the text.

We will use the following identities in some derivations in class; work them out so that you have a good sense for where they come from!

AQ1: Show that 
$$\frac{\sum_n n e^{-nx}}{\sum_n e^{-nx}} = -\frac{d}{dx} \left[ \ln \left( \sum_n e^{-nx} \right) \right].$$

AQ2: Show that 
$$\sum_{n=0}^{k-1} e^{-nx} \approx \frac{1}{1 - e^{-x}}.$$

AQ3: Show that 
$$-\hbar\omega \frac{d}{dx} \left[ \ln \left( \frac{1}{1 - e^{-x}} \right) \right] \approx \frac{\hbar\omega}{1 - e^{-x}}.$$