This is a great title

This is an even greater subtitle

Student: Your name, your.email@hotmail.com
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Here I show a very basic example of how to use the "`problem`" environment I defined using the `\tcolorbox` package. You can define your own environments following the problem environment in the `format.tex` file.

Problem 1: Your title

This is an example problem taken from Sakurai and Napolitano (2020):

(a) Prove the following

(i) $\langle p'|x|\alpha\rangle = \mathrm{i}\hbar\frac{\partial}{\partial p'}\langle p'|\alpha\rangle$.

(ii) $\langle\beta|x|\alpha\rangle = \int \mathrm{d}p'\, \phi^*_\beta(p')\mathrm{i}\hbar\frac{\partial}{\partial p'}\phi_\alpha(p')$,
where $\phi_\alpha(p') = \langle p'|\alpha\rangle$ and $\phi_\beta(p') = \langle p'|\beta\rangle$ are momentum-space wave functions.

(b) What is the physical significance of

$$\exp\left(\frac{\mathrm{i}x\Xi}{\hbar}\right),$$

where x is the position operator and Ξ is some number with the dimension of momentum? Justify your answer.

Notice that the partial derivative and integral are smaller when used in a sentence compared with when you're working in a math environment like `\begin{equation} \end{equation}`. If you want to display the full size of such commands in a sentence, you must use the command `\displaystyle{}`, like it's shown here:

Problem 2: Your title

This is an example problem taken from Sakurai and Napolitano (2020):

(a) Prove the following

(i) $\langle p'|x|\alpha\rangle = \mathrm{i}\hbar\dfrac{\partial}{\partial p'}\langle p'|\alpha\rangle$.

(ii) $\langle\beta|x|\alpha\rangle = \displaystyle\int \mathrm{d}p'\, \phi^*_\beta(p')\mathrm{i}\hbar\frac{\partial}{\partial p'}\phi_\alpha(p')$,
where $\phi_\alpha(p') = \langle p'|\alpha\rangle$ and $\phi_\beta(p') = \langle p'|\beta\rangle$ are momentum-space wave functions.

(b) $\cdots$

I use the package `physics` which provides a great variety of commands for common operations and symbols. For instance, instead of typing `\dfrac{\partial x}{\partial t}`, the `physics` package

provides the command `\pdv{x}{t}` which gives the same result. I also defined my own commands, so you can take a look in the `commands.tex` file if you like. I'd also suggest to create a folder and work each problem in a separate `.tex` file. I already included such folder in the `Overleaf` template, but you won't see it if you download the `Github` template.

References

Sakurai, J. J. and Napolitano, J. (2020). *Modern Quantum Mechanics*. Cambridge University Press.