Assignment 1: Week 2

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Math

In this week's session, we learned about using the math mode of LaTeX(isn't that fancy? - you can type it by saying `\LaTeX`). You can enter math mode for inline text with any of the following:

```
\begin{math}...\end{math}
\(...\)
$...$
```

And you can do out-of-line equations with:

```
\begin{equation}...\end{equation}
\[...\]
$$...$$
```

For your first exercise, please produce the following equations:

$$\int_{\alpha}^{\beta} \frac{\partial^2 \Psi}{\partial x^2} d\tau \tag{1}$$

$$d \sin(\theta) = \pm \sqrt[3]{n^3} \lambda \tag{2}$$

$$2\Gamma_2 + \Omega_2 \rightarrow 2\Gamma_2 \Omega \tag{3}$$

(HINT: use `\partial`, `\pm`, and `\rightarrow`).

Note: for the equation for Snell's law (Equation 2 ← isn't that link cool? We'll do those next week), be sure you get $\sin(\theta)$ not $sin(\theta)$.

If you feel ambitious, check out one of the symbol sheets and try to write something a little different:

$$\int_{\mathcal{S}} \nabla^2 V \tag{4}$$

$$\sum_{i=1}^{n}(\int f_i(x)dx) = \int(\sum_{i=1}^{n} f_i(x))dx \tag{5}$$

$$\widehat{H}\Psi = i\hbar\frac{\partial\Psi}{\partial t} = -\frac{\hbar^2}{2m}\nabla^2\Psi + V\Psi = E\Psi \tag{6}$$

Pictures

For now, if you can get the image below with the instructions given, you're right on track.

1. In the preamblel to the document, include the packages `graphics` and `graphicx`. `graphics` is covered in the tutorial, and `graphicx` allows you to use other image formats in addition to `*.ps`.
2. Download http://www.ph.utexas.edu/~sps/pics/sps_logo.png and put it in a folder with path *path*.
3. In the preamble, tell LaTeXwhere the image you just downladed is with `\graphicspath{{`*path*`}}`. For example, you might have (on Windows): `\graphicspath{ {C:/Users/Evan/Downloads/} }`.
4. Now, include it in your document with the following:

```
\begin{figure}[h]
    \includegraphics{sps_logo.png}
\end{figure}
```

and you should end up with:

The `[h]` in the code above simply tells LaTeXto put the image at this point in the document - generally, it may move it to other pages if you don't tell it what to do (which is often the right decision aesthetically speaking).

Tables and Matrices

I'm going to keep this section short because it's kinda tedious. Try to write the Pauli spin matrices in LaTeX:

$$\overline{S} = \begin{pmatrix} S_x & S_y & S_z \end{pmatrix} \tag{7}$$

$$S_x = \frac{\hbar}{2}\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \tag{8}$$

$$S_y = \frac{\hbar}{2}\begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix} \tag{9}$$

$$S_z = \frac{\hbar}{2}\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \tag{10}$$

For this next part, you will also need the `tabularx` package included in the preamble (it gives you the horizontal lines and multiple column entries).

Now, try to write this simple data set (mind the justification!):

Fibonacci Numbers

x	y	x+y
1	1	2
1	2	3
2	3	5
3	5	8
...	...	...
17711	28657	46368

References

[1] SPS LaTeXHome Page
http://www.ph.utexas.edu/~sps/LaTeX/

[2] Recommended symbol sheet
http://amath.colorado.edu/documentation/LaTeX/Symbols.pdf

[3] Wikibooks on LaTeX
en.wikibooks.org/wiki/LaTeX