

# CHEM-630 Assignment homework-number-here

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## 1: Mathematical Symbols

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This is an example of an answer to a homework question. In your answer, you may want to use a variety of mathematical symbols:

- Fractions:  $\frac{2}{3}$ , or (equivalently)  $\frac{2}{3}$
- Binomial coefficients:  $\binom{5}{2} = 10$
- Subscripts and superscripts:  $t_0$ ,  $t^2$ ,  $t_0^{\frac{2}{3}}$ ,
- Greek letters:  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\lambda$ ,  $\Pi$ .
- Summations:  $\sum_{i=1}^n i = \frac{n(n+1)}{2}$ .

You can refer to Leslie Lamport's "L<sup>A</sup>T<sub>E</sub>X User's Guide and Reference Manual" for more useful info on mathematical typesetting with L<sup>A</sup>T<sub>E</sub>X. Pages 42-46 outline many of the useful math symbols and functions.

Another good reference for the mathematical symbols of L<sup>A</sup>T<sub>E</sub>X is "Inessential LaTeX" by the MIT SIPB group. Find it on the Web at <http://www.mit.edu/afs/sipb/project/doc/latex/guide.PS>

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## 2: Little Gauss's Formula

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This is another example of a question. In this case, it's a multi-part question.

(a) Recall *Little Gauss's formula*:

$$\sum_{i=1}^n i = \frac{n(n+1)}{2} \tag{1}$$

(b) Now, equation 1 can be proven by induction as follows:

- **Base case:**  $n = 1$ :  $1 = 1(2)/2 = 1$ .
- **Inductive hypothesis:** assume the equation holds for  $n = 2 \dots k$ .
- **Inductive step:** for  $n = k + 1$ , we have

$$\sum_{i=1}^{k+1} i = (k+1) + \sum_{i=1}^k i$$

Using the inductive hypothesis, we can substitute for the second term on the righthand side:

$$\begin{aligned}\sum_{i=1}^{k+1} i &= (k+1) + k(k+1)/2 \\ &= \frac{2k+2 + k(k+1)}{2} \\ &= \frac{k^2 + 3k + 2}{2} \\ &= \frac{(k+1)(k+2)}{2}\end{aligned}$$

Lo and behold! The last line shows that for  $n = k + 1$ , little Gauss' formula still holds for  $n = k + 1$ ! We've showed that the formula holds for  $n = 1$ , and we've shown that if it holds for  $n = k$  it must hold for  $n = k + 1$ . Therefore, it must hold for all  $n$ .