

ICCS208: Assignment homework-number-here

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The date

1: Mathematical Symbols

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

You can refer to Leslie Lamport's "L^AT_EX User's Guide and Reference Manual" for more useful info on mathematical typesetting with L^AT_EX. Pages 42–46 outline many of the useful math symbols and functions.

2: Little Gauss's Formula

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 .