

Bi-conditional Statement Pre-class assignment
INSERT YOUR NAME HERE

Complete the following proof. (Note you mostly just need to copy and the first half of the proof.) Print your compiled document and bring it to class.

Definition: If a and b are integers, we say a divides b if there is another integer k such that $ak = b$. Denote this by $a|b$.

1. Let a, b and m be integers such that $m \neq 0$. Prove that $a|b$ if and only if $ma|mb$.

Proof. Let a, b and m be integers such that $m \neq 0$

(\Rightarrow) Assume that $a|b$. This means that there is some integer k such that $ak = b$. Multiply both sides of this equation by m to get:

$$m(ak) = mb.$$

We rearrange via associativity to get

$$(ma)k = mb.$$

Therefore $ma|mb$

(\Leftarrow) Assume that $ma|mb$. This means that there is some k such that

$$(ma)k = mb. \tag{1}$$

Since $m \neq 0$, we can divide by m on both sides of equation (1) to get

$$ak = b,$$

thus proving that $a|b$.

□

Some information about using L^AT_EX (pronounced “Lah-Tech” or “Lay-Tech”).

- Any mathematical symbols will go between \$... \$.
- To display an equation on its own line use \$\$... \$\$.
- To get a newline, use either `\\` or skip two lines in the editor. The first option will simply skip to the next line, the second option will create a new paragraph.
- To get superscripts, use a caret: `$A^{\{123\}}$`, and for subscripts, an underscore: `$x_{\{ij\}}$`.
- Many standard functions and characters exist as commands, for example $\cos(2\pi)$ is produced using `$\cos(2\pi)$`.

- To make a matrix, such as $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$, use
`$A=\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$`.
Here the `&` indicates an alignment and `\\` gives a new line.
- I highly recommend you learn how to use this text editor. It will make proof-writing much easier and your future-selves much happier.
- Don't hesitate to ask if you have any questions.