Useful Algebraic Notation, Symbols
and LaTeX Commands
August 11, 2017

1. $\frac{x^2-2x-15}{x^2+6x+9} = \frac{x-5}{x+3}$ is produced by

   ```
   $\frac{x^2-2x-15}{x^2+6x+9}=\frac{x-5}{x+3}$.
   ```

2. $\sum_{k=1}^{n} a_n$ is produced by

   ```
   $\sum_{k=1}^na_n$.
   ```

3. $\displaystyle\sum_{k=1}^{n} a_n$ is produced by using the displaystyle command together with the previous mathematical formula as follows

   ```
   $\displaystyle{\sum_{k=1}^na_n}$.
   ```

4. $\sqrt{5\pi + \log_2 7}$ and $\sqrt[5]{5\pi + \sin^2 7}$ are produced by

   ```
   $\sqrt{5\pi+\log_2{7}}$ and $\sqrt[5]{5\pi+\sin^2{7}}$.
   ```

5. $a_0 + a_1x + \cdots + a_nx^n$ and $S_1 \cup S_2 \cup \ldots \cup S_k$ are produced by

   ```
   $a_0+a_1x+ \cdots +a_nx^n$ and $S_1 \cup S_2 \cup \ldots \cup S_k$.
   ```

6. $\mathcal{C}, \mathcal{Q}, \mathcal{R}, \mathcal{Z}$ and $\mathbb{C}, \mathbb{Q}, \mathbb{R}, \mathbb{Z}$ are produced by

   ```
   $\mathcal{C, Q, R, Z}$
   ```

   and

   ```
   $\mathbb{C,Q,R,Z}$
   ```

   respectively.

7. $17x + 14 \equiv 2x + 4 \pmod{5}$ and $\{a \in X \mid 2 \quad \text{divides} \quad a^3 - a\}$ are produced by

   ```
   $17x+14 \equiv 2x+4 \pmod{5}$ and
   ```

   ```
   $\{a \in X \mid 2 \quad \mbox{divides} \quad a^3-a\}$.
   ```

8. $\phi_a : F[x] \to \mathcal{C}$ and $R_1 \times R_2 \simeq S$ are produced by

   ```
   $\phi_a:F[x] \to \mathcal{C}$ and $R_1 \times R_2 \simeq S$.
   ```

9. $\alpha, \beta, \gamma, \delta, \Delta, \zeta, \Omega, \theta$ are produced by

```
$\alpha, \beta, \gamma, \delta, \Delta, \zeta, \Omega, \theta$.
```

10. $\begin{bmatrix} 1 & 2 & -3 & a \\ \sigma & 3 & 0 & 1 \\ -5 & 2 & 1 & 3 \end{bmatrix}$ is produced by

```
$\left[ \begin{array}{rrrr} 1 & 2 & -3 & a\\
                            \sigma& 3 & 0 & 1\\
                            -5 & 2 & 1 & 3 \end{array} \right]$.
```

11.

$$\begin{aligned} x^3 - x^2 - 12x - (2x^2 + 6x) &= x(x^2 - x - 12 - (2x + 6)) && (1)\\ &= x((x-4)(x+3) - 2(x+3)) \\ &= x(x+3)(x-4-2) && (2)\\ &= x(x+3)(x-6) && (3) \end{aligned}$$

is produced by

```
\begin{eqnarray}
x^3-x^2-12x -(2x^2+6x) & = & x(x^2-x-12 -(2x+6)) \\
                       & = & x((x-4)(x+3)-2(x+3)) \nonumber \\
                     & = & x(x+3)(x-4-2) \\
                       & = & x(x+3)(x-6)
\end{eqnarray}.
```

Here is an example of making an ordered list.

1. This is the first item in the list.
2. This is the second item in the list.

This was made by

```
\begin{enumerate}
\item This is the first item in the list.
\item This is the second item in the list.
\end{enumerate}
```

If you would rather use bullets instead of number you can do this.

- This is the first item in the list.
- This is the second item in the list.

This was made using the following commands.

```
\begin{itemize}
\item This is the first item in the list.
\item This is the second item in the list.
\end{itemize}
```

If you would like something else instead of numbers or bullets, then you can use whatever you want. For example,

- ♣ This is the first item in the list.
- ♡ This is the second item in the list.

The above was produced as follows:[1]

```
\begin{itemize}
\item[$\clubsuit$] This is the first item in the list.
\item[$\heartsuit$] This is the second item in the list.
\end{itemize}
```

Here is how the footnote (that was automatically numbered and placed at the bottom of the page by LaTeX) was produced

```
The above was produced as follows:\footnote{Who would use playing card symbols as symbols in a list?}
```

[1] Who would use playing card symbols as symbols in a list?