LaTeX for Math Formatting

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LaTeX in Statistical Reports

There are two main modes of typesetting math in LaTeX, embedding the math directly by *encapsulating* it in *dollar signs*, or using a predefined *math environment*.

Inline Math

The use of `$` for inline math environments is common, but it is difficult for the computer to track a missing `$`. Therefore, I advocate for the use of the *displaymath* environment, using

```
\[
math equation
\]
```

for inline math environments.

Example:

This formula

`$f(x) = x^2$`

is an example.

Or we could use,

`\[ f(x) = x^2 \]`

instead.

Equations and Align

Arguably the most useful *math environments* are the *equation environment* and the *align environment* for both single and multiple equations.

```
\begin{equation}
  1 + 2 = 3
\end{equation}
```

$$1 + 2 = 3 \tag{1}$$

- This should produce a numbered equation.
- The *equation* environment lets LaTeXknow that what you are typing is math, so no $s are needed!

```
\begin{equation*}
  1 = 3 - 2
\end{equation*}
```

$$1 = 3 - 2$$

- This should produce a un-numbered equation.
- A * at the end of most LaTeXcommands (equation, section, align, etc.) will produce the un-numbered counterpart of the original.

```
\begin{align}
  1 + 2 &= 3 \\
  1 &= 3 - 2
\end{align}
```

$$1 + 2 = 3 \tag{2}$$
$$1 = 3 - 2 \tag{3}$$

- This should produce a two numbered equations, where the equal signs are aligned with each other.
  - The &= tells the *align environment* what = to align (no spaces between & and =).
  - The \\ tells the *align environment* to break the line (you don't need a break on the last line).

```
\begin{align*}
  f(x) &= x^2 \\
  g(x) &= \frac{1}{x} \\
  F(x) &= \int^a_b \frac{1}{3}x^3
\end{align*}
```

$$f(x) = x^2$$
$$g(x) = \frac{1}{x}$$
$$F(x) = \int_b^a \frac{1}{3}x^3$$

- This should produce three un-numbered equations, where the equal signs are aligned with each other.
  - The `\frac{}{}` command produces a fraction, where the first `{}` contains the numerator and the second `{}` contains the denominator.
  - The `\int` command produces an integral, where the bounds are specified as follows: `\int_{lower}^{upper}`.

```
\begin{equation}
\frac{1}{\sqrt{x}}
\end{equation}
```

$$\frac{1}{\sqrt{x}} \tag{4}$$

- This should produce a numbered equation.
  - The `\sqrt{} command produces a square root of the number in‘`.
  - Note this second use of `\frac`, where the denominator contains *another* command!