Exercises (October 30, 2017):

1. Exercise: try typesetting this
   It does not work with beamer
   
   \textgreater The first entry here
   \textgreater Then the second
   \textgreater etc
   
   • The first entry here
   • Then the second
   • etc

   \textit{Hint:} Use \texttt{\textgreater} for “>” and \$\bullet$ for “•”.

2. Make a triple nested list.

3. How do you get this default:
   
   \textgreater First level
   \textstar Second level
   \textbullet Third level
   
   Check that it works by typesetting the triple nested list of the previous exercise.

   \textit{Hint:} Symbols used: \texttt{\textgreater}, \$\textstar$, \$\bullet$.

4. Typeset this:
   
   \textbf{First} The first entry here
   \textbf{Second} Then the second
   \textbf{Last} Then the last
   
   with the descriptors “First” in red color, “Second” in blue and “Last” in black.

   \textit{Hint:} \texttt{\usepackage{color}}
Solutions

Exercise 1: \renewcommand{\labelitemi}{\textgreater} 
\begin{itemize} 
  \item The first entry here 
  \item Then the second 
  \item etc 
\end{itemize} 
\renewcommand{\labelitemi}{$\bullet$} 
\begin{itemize} 
  \item The first entry here 
  \item Then the second 
  \item etc 
\end{itemize} 

Exercise 2: Here is an example of a triple nested list:
\begin{itemize} 
  \item The first entry here 
  \begin{itemize} 
    \item The first sub-entry here 
    \begin{itemize} 
      \item The first sub-sub-entry here 
      \item Then the second sub-sub-entry 
    \end{itemize} 
    \item etc 
  \end{itemize} 
  \item Return to original list, etc 
\end{itemize} 

Exercise 3: \renewcommand{\labelitemi}{\textgreater} 
\renewcommand{\labelitemii}{$\star$} 
\renewcommand{\labelitemiii}{$\bullet$} 

Exercise 4: Per the hint place \usepackage{color} in the preamble. Then
\begin{description} 
  \item[\color{red}First] The first entry here 
  \item[\color{blue}Second] Then the second 
  \item[\color{black}Last] Then the last 
\end{description}
Exercises (November 13, 2017):

1. Typeset

\[ a = b \quad c = d \quad e = f \]
\[ g = b \quad h = d \quad k = f \]

2. Typeset

\[ a^2 = b^2 + c^2 \]

3. Typeset

\[ F = G_N \frac{m_1 m_2}{r^2} \]

4. Typeset

\[ n_{\pm}(E, T) = \frac{1}{e^{\frac{E}{k_B T}} \pm 1} = \frac{1}{e^{\hbar \omega/k_B T} \pm 1} \]

*Note: This uses the greek letter \omega and the symbol \hbar.*

5. Typeset

\[ F_{\mu\nu} = [D_\mu, D_\nu] = \partial_\mu A_\nu - \partial_\nu A_\mu = \partial_{[\mu} A_{\nu]} \]

*Note: This uses the greek letters \mu and \nu, and the symbol \partial.*

6. Typeset these (the first is inline, the next two are separate displayed equations):

"Taylor expansion \( e^x = \sum_{n=0}^{\infty} \frac{1}{n!} x^n.\)"

\[ \int_0^1 \frac{df}{dx} \, dx = f(1) - f(0) \]

\[ e^{\zeta(s)} = \prod_{n=1}^{\infty} e^{1/n^s} \]

(This uses the greek letter zeta.)
Exercise 1: \begin{align*}
a=&b & c=&d & e=&f \\
g=&b & h=&d & k=&f
\end{align*}
Note: the star in \texttt{align*} is used in order to omit equation numbering.

Exercise 2: \item Typeset
\[
a^2=b^2+c^2
\]
Exercise 3: \[
F = G_N\frac{m_1m_2}{r^2}
\]
Exercise 4: \[
n_{\pm}(E,T)=\frac{1}{e^{\frac{E}{k_BT}}\pm1}
=\frac{1}{e^{\frac{\hbar\omega}{k_BT}}\pm1}
\]
Exercise 5: \[
F_{\mu\nu} = [D_\mu , D_\nu]
=\partial_\mu A_\nu-\partial_\nu A_\mu
=\partial_{[\mu} A_{\nu]}\mu
\]
Exercise 6: ‘‘Taylor expansion $e^{-x}=\sum_{n=0}^\infty \frac{1}{n!}x^n\cdot$’’
\[
\int_{0}^1 \frac{df}{dx}dx= f(1)-f(0)
\]
\[
e^{-\zeta(s)}=\prod_{n=1}^\infty e^{-1/n^s}\]
Exercises (November 20, 2017):

1. Typeset this:
   “Taylor expansion $e^x = \sum_{n=0}^{\infty} \frac{1}{n!}x^n$.”

   \[
   \int_{0}^{1} \frac{df}{dx} \, dx = f(1) - f(0)
   \]

   \[
   e^{\zeta(s)} = \prod_{n=1}^{\infty} e^{1/n^s}
   \]

   (This uses the greek letter zeta).

2. Typeset these two expressions as separate displayed equations:

   \[
   2 \left[ \frac{3a}{z} + 2 \left( \frac{a}{d} + 7 \right) \right]
   \]

   \[
   x^2 \left( \sum_{n} A_n + 3 \left( b + \frac{1}{c} \right) \right) \]

3. Typeset this, using the multiline* environment:

   \[
   2 \left( 1 + \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \frac{1}{2^4} + \frac{1}{2^5} + \frac{1}{2^6} + \frac{1}{2^7} + \frac{1}{2^8} + \frac{1}{2^9} + \frac{1}{2^{10}} + \frac{1}{2^{11}} \right) = \frac{4095}{1024}
   \]

4. Make the first entry of Exercise 2 look like this:

   \[
   2 \left[ \frac{3a}{z} + 2 \left( \frac{a}{d} + 7 \right) \right]
   \]
Exercise 1: ‘‘Taylor expansion $e^x=\sum_{n=0}^\infty \frac{1}{n!}x^n$.’’
\[
\int_{0}^{1} \frac{df}{dx} \, dx = f(1) - f(0)
\]
\[
e^{\zeta(s)} = \prod_{n=1}^{\infty} e^{1/n^s}
\]

Exercise 2: \[
2 \left[ 3 \frac{a}{z} + 2 \left( \frac{a}{d} + 7 \right) \right] \]
and
\[
\left. x^2 \left( \sum_n A_n + 3 \left( b + \frac{1}{c} \right) \right) \right|_0
\]

Exercise 3: \[
\begin{multline*}
2 \left[ 1 + \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \frac{1}{2^4} \\
+ \frac{1}{2^5} + \frac{1}{2^6} + \frac{1}{2^7} \\
+ \frac{1}{2^8} + \frac{1}{2^9} \right] = \frac{4095}{1024}
\end{multline*}
\]

Exercise 4: \[
2 \Bigg[ 3 \frac{a}{z} + 2 \left( \frac{a}{d} + 7 \right) \Bigg]
\]
Exercises (November 27, 2017):

1. Typeset: The Pauli matrices are:

\[
\sigma^1 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \quad \sigma^2 = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix} \quad \text{and} \quad \sigma^3 = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}
\]

Note: The blank in the 2\textsuperscript{nd} entry of the 1\textsuperscript{st} row of \( \sigma^3 \) is a deliberate typo

2. Typset this:

\[
\begin{array}{|c|c|}
\hline
a \times b & c + d \\
\hline
\alpha & \gamma \\
\hline
3 & 1.1 \\
\hline
\end{array}
\]

3. Typeset this:

<table>
<thead>
<tr>
<th>Jersey</th>
<th>First Name</th>
<th>Last Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Cristiano</td>
<td>Ronaldo</td>
</tr>
<tr>
<td>11</td>
<td>Didier</td>
<td>Drogba</td>
</tr>
<tr>
<td>10</td>
<td>Edson</td>
<td>Arantes do Nascimento (Pele)</td>
</tr>
</tbody>
</table>

4. Typeset this:

<table>
<thead>
<tr>
<th>Shape</th>
<th>Area</th>
<th>Perimeter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk of radius ( R )</td>
<td>( \pi R^2 )</td>
<td>( 2\pi R )</td>
</tr>
<tr>
<td>Rectangle of sides ( L_1 ) \ and ( L_2 )</td>
<td>( L_1L_2 )</td>
<td>( 2(L_1 + L_2) )</td>
</tr>
<tr>
<td>Square of side ( L )</td>
<td>( L_1 = L_2 )</td>
<td>( 2(L_1 + L_2) )</td>
</tr>
<tr>
<td>Right triangle, base ( b ) \ and height ( h )</td>
<td>( \frac{1}{2}bh )</td>
<td>( b + h + \sqrt{b^2 + h^2} )</td>
</tr>
</tbody>
</table>

5. Optional exercise: Typeset this (note the alignment at equal sign)

<table>
<thead>
<tr>
<th>( a )</th>
<th>( x^2 + y = 30 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( b )</td>
<td>( 100 = \sin(\theta) + \cos \varphi )</td>
</tr>
<tr>
<td>( c )</td>
<td>( q \cup p = q \cap p )</td>
</tr>
</tbody>
</table>
Solutions

Exercise 1: The Pauli matrices are:
\[
\sigma^1 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \quad \sigma^2 = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}, \quad \sigma^3 = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}
\]

Exercise 2: \[
\begin{array}{||r|l||}
| a \times b & c + d | \\
\alpha & \gamma \\
\hline
3 & 1.1
\end{array}
\]

Exercise 3: \[
\begin{center}
\begin{tabular}{c||l|l}
Jersey & First Name & Last Name \\
\hline
10 & Cristiano & Ronaldo \\
\hline
11 & Didier & Drogba \\
\hline
10 & Edson & Arantes do Nascimento (Pele)
\end{tabular}
\end{center}
\]

Exercise 4: \[
\begin{center}
\begin{tabular}{|p{2in}|c|c|}
Shape & Area & Perimeter \\
\hline
Disk of radius $R$ & $\pi R^2$ & $2\pi R$ \\
\hline
Rectangle of sides $L_1$ and $L_2$ & $L_1L_2$ & $2(L_1+L_2)$ \\
\hline
Square of side $L_1=L_2$ & & \\
\hline
Right triangle, base $b$ and height $h$ & $\frac12bh$ & $b+h+\sqrt{b^2+h^2}$
\end{tabular}
\end{center}
\]

Exercise 5: Solution:
\[
\begin{center}
\begin{tabular}{|l|l@{~$=$~}l|}
\hline
a & $x^2+y$ & 30 \\
\hline
b & $100$ & $\sin(\theta)+\cos\varphi$ \\
\hline
c & $q \cup p$ & $q \cap p$
\end{tabular}
\end{center}
\]
1. Experiments:

(a) Paste a lot of text into your document, enough for a couple of pages of typeset material, at least 6 good paragraphs.
(Hint: Find one good paragraph, copy it into the buffer, and paste it many times into your document).
Then insert your *Dream Team Table* between paragraphs 2 and 3. Include a caption with a `\label{dreamteam}` (you provide the text). Insert `\ref{dreamteam}` somewhere in the text before and again after where you inserted the table.
Typeset once with each of positioning b, t and h.

(b) Copy the table and caption and paste into the space between paragraphs 4 and 5. Typeset. Check console (warning on repeated labels).
Change label of second table: `\label{dreamteam2}`. Insert a few `\ref{dreamteam2}` somewhere in the text before and again after where you inserted the table.

2. Resize and crop the triton image to get this:

3. *Experiment* with images just as you did with tables above, and with both tables and figures in the same document. Download additional figures from the web.
Solutions

Exercise 1: Make sure you leave a blank line between paragraphs!

Exercise 2:

\begin{center}
\includegraphics[width=3cm,trim= 7cm 6cm 8cm 1cm,clip]{gl-5-triton.png}+
\end{center}