Exercises (February 7, 2018):

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

   Hint: Use \textgreater for “>” and $\bullet$ for “•”.

2. Make a tripple nested list.

3. How do you get this default:
   
   > First level
   * Second level
   * Third level

   Check that it works by typesetting the tripple nested list of the previous exercise.

   Hint: Symbols used: \textgreater, $\star$, $\bullet$.

4. Typeset this:
   
   First  The first entry here
   Second Then the second
   Last   Then the last

   with the descriptors “First” in red color, “Second” in blue and “Last” in black.
   
   Hint: \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 etc
\end{itemize}
\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 (February 14, 2018):

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

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

3. Typeset two of these: \( \varphi \), \( \sigma \), \( \odot \), \( \equiv \), \( \omega \)

4. Typeset
   \[ F = G \frac{m_1 m_2}{r^2} \]

5. Typeset
   \[ n_\pm(E, T) = \frac{1}{e^{E/k_B T} \pm 1} = \frac{1}{e^{\hbar \omega/k_B T} \pm 1} \]
   \textit{Note: This uses the greek letter \( \omega \) and the symbol \( \hbar \).}

6. Typeset
   \[ F_{\mu\nu} = [D_{\mu}, D_{\nu}] = \partial_{\mu} A_{\nu} - \partial_{\nu} A_{\mu} = \partial_{[\mu} A_{\nu]} \]
   \textit{Note: This uses the greek letters \( \mu \) and \( \nu \), and the symbol \( \partial \).}

7. Typeset these (the first is inline, the next two are separate displayed equations):
   
   “Taylor expansion \( e^x = \sum_{n=0}^{\infty} \frac{1}{n!} x^n \).”
   \[ \int_0^1 \frac{df}{dx} \, dx = f(1) - f(0) \]
   \[ e^{\zeta(s)} = \prod_{n=1}^{\infty} e^{1/n^s} \]
   \textit{(This uses the greek letter zeta).}
Solutions

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

\[
\begin{align*}
a^2 &= b^2 + c^2
\end{align*}
\]

Exercise 3: Use package \texttt{wasysym} for \texttt{female, male, taurus, amssymb} for \texttt{\boxminus}, and \texttt{tipa} for \texttt{textschwa}

Exercise 4: \[
F = G_N \frac{m_1 m_2}{r^2}
\]

Exercise 5: \[
n_{\pm} (E, T) = \frac{1}{e^{\frac{E}{k_BT}} \pm 1} = \frac{1}{e^{\frac{\hbar \omega}{k_BT}} \pm 1}
\]

Exercise 6: \[
F_{\mu\nu} = [D_\mu , D_\nu] = \partial_\mu A_\nu - \partial_\nu A_\mu = \partial_{[\mu} A_{\nu]}\]

Exercise 7: ‘‘Taylor expansion $e^x = \sum_{n=0}^{\infty} \frac{1}{n!} x^n$.’’

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

\[
e^{\zeta(s)} = \prod_{n=1}^{\infty} e^{\frac{1}{n^s}}\]
Exercises (February 21, 2018):

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:

   \[
   2 \left[ 3 \frac{a}{z} + 2 \left( \frac{a}{d} + 7 \right) \right] \quad \quad x^2 \left( \sum_n A_n + 3 \left( b + \frac{1}{c} \right) \right) \]

3. Typeset this, using the \texttt{multline*} 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:

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

5. Typeset:
   The Pauli matrices are:

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

   \textbf{Note: The blank in the 2nd entry of the 1st row of $\sigma^3$ is a deliberate typo}
Exercise 1: ‘‘Taylor expansion $e^x=\sum_{n=0}^{\infty} \frac{x^n}{n!}$.’’
\[
\int_{0}^{1} \frac{df}{dx}dx = f(1)-f(0)
\]
\[e^{\zeta(s)}=\prod_{n=1}^{\infty} e^{1/n^s}\]

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: \[
\begin{multline*}
2\left(1+\frac{1}{2}+\frac{1}{2^2}+\frac{1}{2^3}+\frac{1}{2^4} + \frac{1}{2^5}+\frac{1}{2^6}+\frac{1}{2^7} + \frac{1}{2^8}+\frac{1}{2^9}\right) \\
\left(\sum_{n}A_n+3\left(b+\frac{1}{c}\right)\right) = \frac{4095}{1024}
\end{multline*}
\]

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

Exercise 5: The Pauli matrices are:
\[
\begin{pmatrix}0&1\\1&0\end{pmatrix}, \quad \begin{pmatrix}0&-i\\i&0\end{pmatrix} \quad \text{and} \quad \begin{pmatrix}1&0\\0&-1\end{pmatrix}
\]