matrixes in series, one 3×1 followed by 3×3 matrix. To minimize the horizontal space around the variable z a

```
\addtolength{\arraycolsep}{-3pt}
```

is a useful command.

$$I(z) = \delta_0 \begin{cases} D + z & -D \le z \le -p \\ D - \frac{1}{2}\left(p - \frac{z^2}{p}\right) & -p \le z \le p \\ D - z & p \le z \le D \end{cases} \tag{61.1}$$

```
\begin{equation}
\addtolength{\arraycolsep}{-3pt}
I(z)=\delta_{0}\left\{%
  \begin{array}{lcrcl}
    D+z & \quad & -D & \le z\le & -p\\
    D-\frac{1}{2}\left(p-\frac{z^{2}}{p}\right)%
     & \quad & -p & \le z\le & \phantom{-}p\\
    D-z & \quad & p & \le z\le & \phantom{-}D
  \end{array}\right.
\end{equation}
```

The \phantom command replaces exactly that place with whitespace which the argument needs.

61.1   Cases with numbered lines

This is not possible in an easy way, because `cases` uses the array environment for typesetting which has by default no numbering. However, there are some tricky ways to get numbered lines. The following three examples use the `tabular`, the `tabularx` and the `array` environment.

$$\text{some text here} \begin{cases} x = 2 & \text{if } y > 2 \\ x = 3 & \text{if } y \le 2 \end{cases} \tag{61.2}$$
$$\tag{61.3}$$

```
\begin{tabular}{rc}
\ldelim\{{2}{2.75cm}[some text here] &
    \parbox{{\linewidth-3cm-4\tabcolsep}}{
    \vspace*{1ex}
    \begin{flalign}
      x & = 2\quad\text{if }y >2 &\\
      x & = 3\quad\text{if }y \le 2&
    \end{flalign}}
\end{tabular}
```

$$\text{some text here} \begin{cases} x = 2 & \text{if } y > 2 \\ x = 3 & \text{if } y \le 2 \end{cases} \tag{61.4}$$
$$\tag{61.5}$$

```
\begin{tabularx}{\linewidth}{rXc}
\ldelim\{{2}{2.75cm}[some text here]
    & $x=2\quad\text{if }y>2$ &\refstepcounter{equation}(\theequation)\\
    & $x=3\quad\text{if }y\le2$&\refstepcounter{equation}(\theequation)
\end{tabularx}
```

$$\text{some text here}\begin{cases} x = 2 & \text{if } y > 2 \\ x = 3 & \text{if } y \le 2 \end{cases}$$

(61.6)

(61.7)

```
1  \[
2  \begin{array}{rc@{\qquad}c}
3  \ldelim\{{2}{2.75cm}[some text here]
4     & x = 2\quad\text{if }y > 2  & \refstepcounter{equation}(\theequation)\\
5     & x = 3\quad\text{if }y \le 2& \refstepcounter{equation}(\theequation)
6  \end{array}
7  \]
```

62   Arrays

There is a general rule that a lot of mathematical stuff should be divided in smaller
pieces. But sometimes it is difficult to get a nice horizontal alignment when splitting
a formula. The following ones uses the `array` environment to get a proper alignment.

62.1   Quadratic equation

$$
\begin{array}{rcll}
y & = & x^2 + bx + c \\
  & = & x^2 + 2 \cdot \dfrac{b}{2}x + c \\
  & = & \underbrace{x^2 + 2 \cdot \dfrac{b}{2}x + \left(\dfrac{b}{2}\right)^2} - \left(\dfrac{b}{2}\right)^2 + c \\
  &   & \qquad \left(x + \dfrac{b}{2}\right)^2 \\
  & = & \left(x + \dfrac{b}{2}\right)^2 - \left(\dfrac{b}{2}\right)^2 + c & \left| + \left(\dfrac{b}{2}\right)^2 - c \right. \\
y + \left(\dfrac{b}{2}\right)^2 - c & = & \left(x + \dfrac{b}{2}\right)^2 & |(\text{Scheitelpunktform}) \\
y - y_S & = & (x - x_S)^2 \\
S(x_S; y_S) & \text{bzw.} & S\left(-\dfrac{b}{2}; \left(\dfrac{b}{2}\right)^2 - c\right)
\end{array}
$$

(62.1)

```
1   \begin{equation}
2   \begin{array}{rcll}
3   y & = & x^{2}+bx+c\\
4      & = & x^{2}+2\cdot{\displaystyle\frac{b}{2}x+c}\\
5      & = & \underbrace{x^{2}+2\cdot\frac{b}{2}x+\left(\frac{b}{2}\right)^{2}}-{\displaystyle%
6    \left(\frac{b}{2}\right)^{2}+c}\\
7     &  & \qquad\left(x+{\displaystyle \frac{b}{2}}\right)^{2}\\
8      & = & \left(x+{\displaystyle \frac{b}{2}}\right)^{2}-\left({\displaystyle%
9    \frac{b}{2}}\right)^{2}+c & \left|+\left({\displaystyle%
10   \frac{b}{2}}\right)^{2}-c\right.\\
11   y+\left({\displaystyle \frac{b}{2}}\right)^{2}-c & = & \left(x+{\displaystyle%
12   \frac{b}{2}}\right)^{2} & \left|(\textrm{Scheitelpunktform})\right.\\
13   y-y_{S} & = & (x-x_{S})^{2}\\
14   S(x_{S};y_{S}) & \,\textrm{bzw.}\, & S\left(-{\displaystyle%
15   \frac{b}{2};\,\left({\displaystyle \frac{b}{2}}\right)^{2}-c\right)
16   \end{array}
17   \end{equation}
```