

in which the commands are executed. The first line is an `if` statement with a conditional expression. If the conditional expression is true, the program executes group 1 of commands between the `if` and the `else` statements and then skips to the end. If the conditional expression is false, the program skips to the `else` and then executes group 2 of commands between the `else` and the `end`.

6.2.3 The `if-elseif-else-end` Structure

The `if-elseif-else-end` structure is shown in Figure 6-3. The figure shows how the commands are typed in the program, and gives a flowchart that illustrates the flow, or the sequence, in which the commands are executed. This structure includes two conditional statements (`if` and `elseif`) that make it possible to select one out of three groups of commands for execution. The first line is an `if` statement with a conditional expression. If the conditional expression is true, the program executes group 1 of commands between the `if` and the

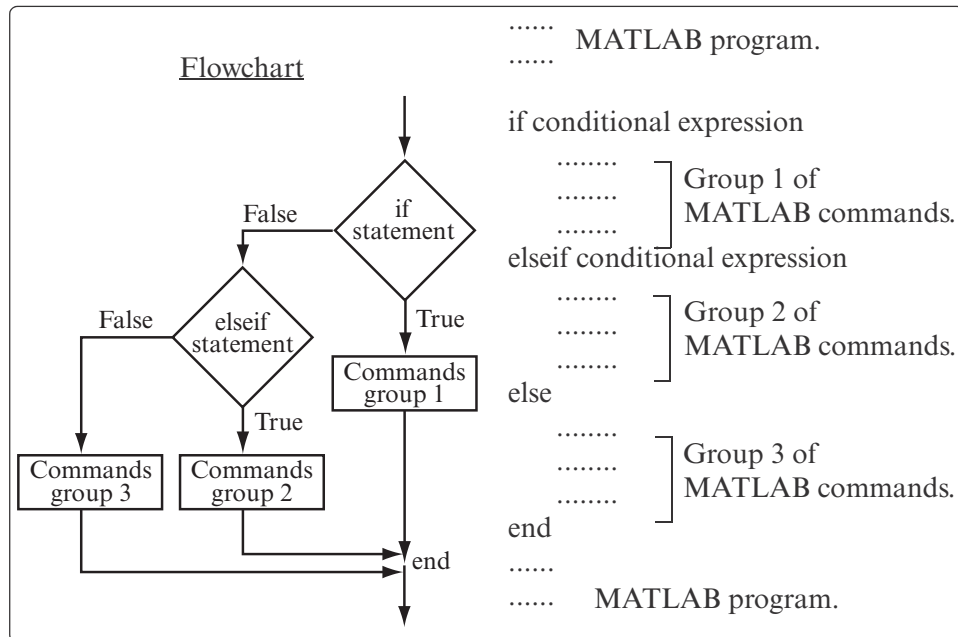


Figure 6-3: The structure of the `if-elseif-else-end` conditional statement.

`elseif` statements and then skips to the `end`. If the conditional expression in the `if` statement is false, the program skips to the `elseif` statement. If the conditional expression in the `elseif` statement is true, the program executes group 2 of commands between the `elseif` and the `else` and then skips to the `end`. If the conditional expression in the `elseif` statement is false, the program skips to the `else` and executes group 3 of commands between the `else` and the `end`.

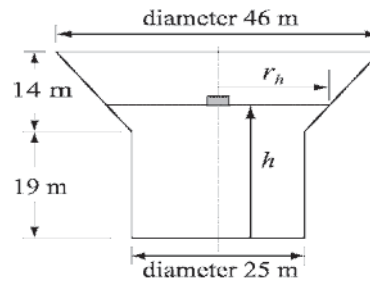
It should be pointed out here that several `elseif` statements and associ-

ated groups of commands can be added. In this way more conditions can be included. Also, the `else` statement is optional. This means that in the case of several `elseif` statements and no `else` statement, if any of the conditional statements is true the associated commands are executed; otherwise nothing is executed.

The following example uses the `if-elseif-else-end` structure in a program.

Sample Problem 6-3: Water level in water tower

The tank in a water tower has the geometry shown in the figure (the lower part is a cylinder and the upper part is an inverted frustum of a cone). Inside the tank there is a float that indicates the level of the water. Write a MATLAB program that determines the volume of the water in the tank from the position (height h) of the float. The program asks the user to enter a value of h in m, and as output displays the volume of the water in m^3 .



Solution

For $0 \leq h \leq 19$ m the volume of the water is given by the volume of a cylinder with height h : $V = \pi 12.5^2 h$.

For $19 \leq h \leq 33$ m the volume of the water is given by adding the volume of a cylinder with $h = 19$ m, and the volume of the water in the cone:

$$V = \pi 12.5^2 \cdot 19 + \frac{1}{3} \pi (h - 19) (12.5^2 + 12.5 r_h + r_h^2)$$

where $r_h = 12.5 + \frac{10.5}{14}(h - 19)$.

The program is:

```
% The program calculates the volume of the water in the
water tower.
h=input('Please enter the height of the float in meter ');
if h > 33
    disp('ERROR. The height cannot be larger than 33 m.')
elseif h < 0
    disp('ERROR. The height cannot be a negative number.')
elseif h <= 19
    v = pi*12.5^2*h;
    fprintf('The volume of the water is %7.3f cubic meter.\n',v)
```