The expression `end` is very useful at this point, since it can be used to refer to the final element within an array. In the previous example `f(end)` gives the value of `f(21)` since the length of `f` is 21.

Example 1.21 *We now show how to extract various parts of the array* `x`.

```
x = linspace(0,1,10);
y = x(1:end);       % Whole of x
y = x(1:end/2);     % First half
y = x(2:2:end);     % Even indices only
y = x(2:end-1);     % All but the last one
```

1.8 Tasks

In this introductory chapter we shall give quite a few details (at least initially) concerning these suggested tasks. However, as the reader's grasp of the MATLAB syntax develops the tasks will be presented more like standard questions (the solutions are given at the back of the book in Appendix C).

Task 1.1 *Calculate the values of the following expressions (to find the MATLAB commands for each function you can use the Glossary, see for instance the entry for* `tan` *on page 386 or the* `help` *command,* `help tan`*).*

$$p(x) = x^2 + 3x + 1 \text{ at } x = 1.3,$$
$$y(x) = \sin(x) \text{ at } x = 30^\circ,$$
$$f(x) = \tan^{-1}(x) \text{ at } x = 1,$$
$$g(x) = \sin\left(\cos^{-1}(x)\right) \text{ at } x = \frac{\sqrt{3}}{2}.$$

Task 1.2 *Calculate the value of the function* $y(x) = |x| \sin x^2$ *for values of* $x = \pi/3$ *and* $\pi/6$ *(use the MATLAB command* `abs(x)` *to calculate* $|x|$*).*

Task 1.3 *Calculate the quantities* $\sin(\pi/2)$, $\cos(\pi/3)$, $\tan 60^\circ$ *and* $\ln(x + \sqrt{x^2+1})$ *where* $x = 1/2$ *and* $x = 1$. *Calculate the expression* $x/((x^2+1)\sin x)$ *where* $x = \pi/4$ *and* $x = \pi/2$. *(If you are getting strange answers in the form*

of rationals you may well have left the format as `rat`*, so go back to the default by typing* `format`*).*

Task 1.4 *Explore the use of the functions* `round`*,* `ceil`*,* `floor` *and* `fix` *for the values* $x = 0.3$*,* $x = 1/3$*,* $x = 0.5$*,* $x = 1/2$*,* $x = 1.65$ *and* $x = -1.34$*.*

Task 1.5 *Compare the MATLAB functions* `rem(x,y)` *and* `mod(x,y)` *for a variety of values of* x *and* y *(try* $x = 3, 4, 5$ *and* $y = 3, 4, -4, 6$*). (Details of the commands can be found using the* `help` *feature).*

Task 1.6 *Evaluate the functions*

1. $y = x^3 + 3x^2 + 1$
2. $y = \sin x^2$
3. $y = (\sin x)^2$
4. $y = \sin 2x + x \cos 4x$
5. $y = x/(x^2 + 1)$
6. $y = \frac{\cos x}{1+\sin x}$
7. $y = 1/x + x^3/(x^4 + 5x \sin x)$

for x *from 1 to 2 in steps of 0.1*

Task 1.7 *Evaluate the function*

$$y = \frac{x}{x + \frac{1}{x^2}},$$

for $x = 3$ *to* $x = 5$ *in steps of* 0.01*.*

Task 1.8 *Evaluate the function*

$$y = \frac{1}{x^3} + \frac{1}{x^2} + \frac{3}{x},$$

for $x = -2$ *to* $x = -1$ *in steps of* 0.1*.*

Task 1.9 (D) *The following code is supposed to evaluate the function*

$$f(x) = \frac{x^2 \cos \pi x}{(x^3 + 1)(x + 2)},$$

for $x \in [0,1]$ (using 200 steps). Correct the code and check this by evaluating the function at $x = 1$ using `f(200)` which should be $-1/6$.

```
x = linspace(0,1);
clear all
g = x^3+1;
H = x+2;
z = x.^2;
y = cos xpi;
f = y*z/g*h
```

Task 1.10 (D) *Debug the code which is supposed to plot the polynomial $x^4 - 1$ between $x = -2$ and $x = 2$ using 20 points.*

```
x = -2:0.1:2;
c = [1 0 0 -1];
y = polyval(c,x);
plot(y,x)
```

Task 1.11 (D) *Debug the code which is supposed to set up the function $f(x) = x^3 \cos(x+1)$ on the grid $x = 0$ to 3 in steps of 0.1 and give the value of the function at $x = 2$ and $x = 3$.*

```
x = linspace(0,3);
f = x^3.*cos x+1;
% x = 2
f(2)
% x = 3
f(End)
```