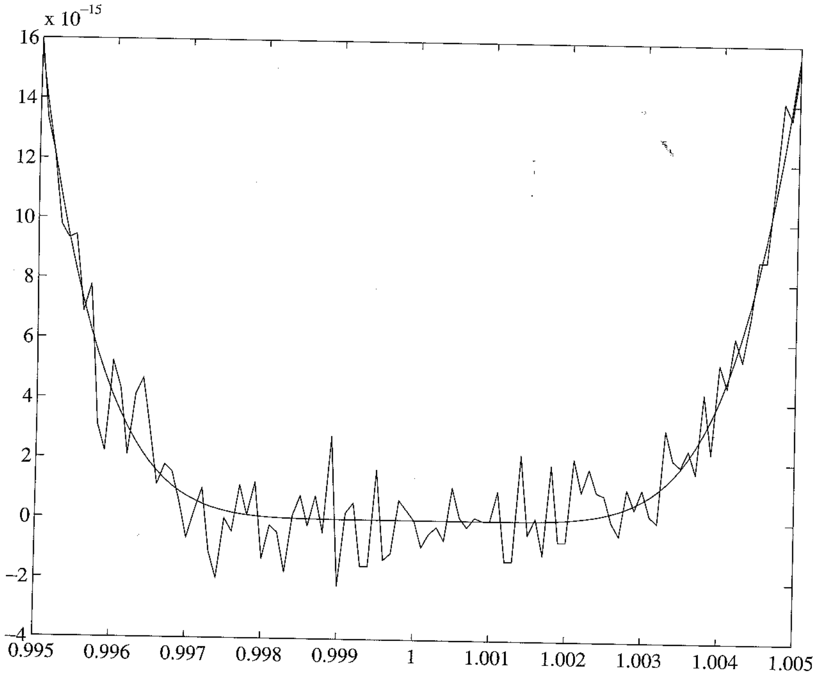

Figure 1.1. Two ways of evaluating $f(x) = (1 - x)^6$.

before an operation denotes componentwise operations. The % sign indicates that the remainder of the line is a comment and does not affect the computations. The actual plot is produced by `plot`, and saved as a postscript file using `print`.)

1.1.9 Algorithm: Draw Figure 1.1

```
x=(9950:10050)/10000;
disp(['number of evaluation points: ',num2str(size(x,2))]);
y=(1-x).^6;
% a compact way of writing the Horner scheme:
z=((((((x-6).*x+15).*x-20).*x+15).*x-6).*x+1);
plot(x,[y;z]); % display graph on screen
print -deps horner.ps % save figure in file horner.ps
```

The figures illustrate a typical problem in numerical analysis. The simple expression $(1 - x)^6$ produces the expected curve. However, for the expanded expression, monotonicity of f is destroyed through effects of finite precision arithmetic, and instead of a single minimum of zero at $x = 1$, we obtain more

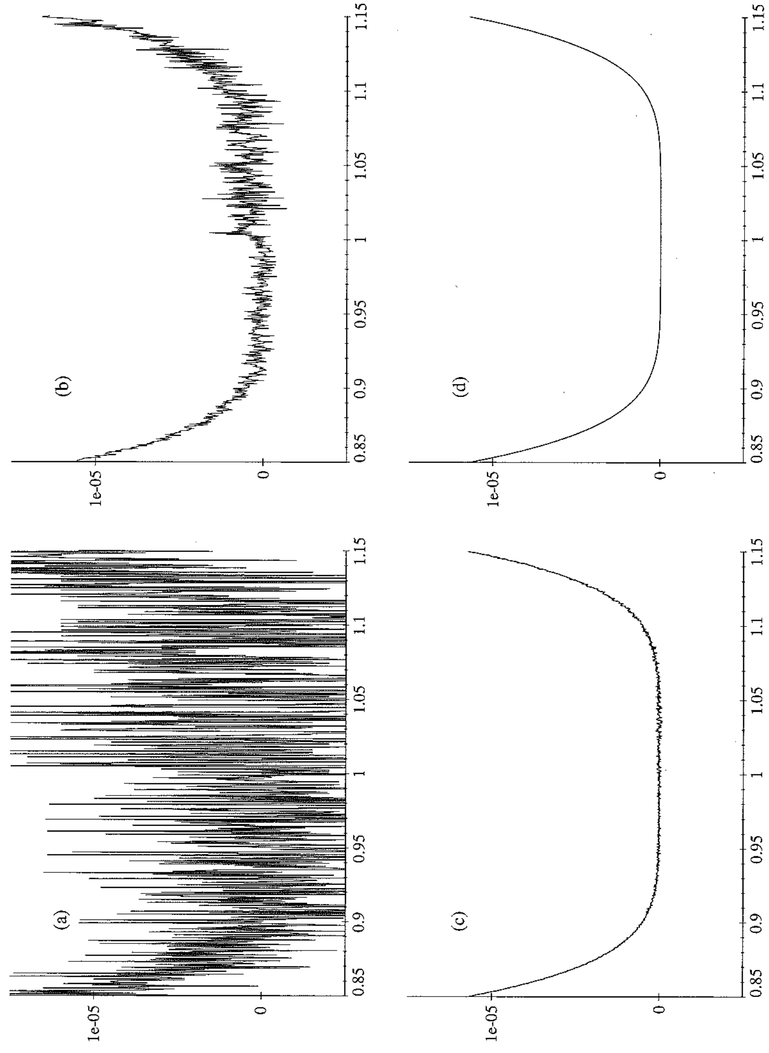

Figure 1.2. $p(x) = 1 - 6x + 15x^2 - 20x^3 + 15x^4 - 6x^5 + x^6$ evaluated in arithmetic with (a) 7, (b) 8, (c) 9, and (d) 16 decimal figures.