For the equation

$$f(x) = x^3 - 0.03x^2 + 2.4 \times 10^{-6} = 0$$

the Newton-Raphson method reduces to

$$x_{i+1} = x_i - \frac{x_i^3 - 0.03x_i^2 + 2.4 \times 10^{-6}}{3x_i^2 - 0.06x_i}$$

For $x_0 = 0$ or $x_0 = 0.02$, division by zero occurs (Figure 4). For an initial guess close to 0.02 such as $x_0 = 0.01999$, one may avoid division by zero, but then the denominator in the formula is a small number. For this case, as given in Table 2, even after 9 iterations, the Newton-Raphson method does not converge.

Table 2Division by near zero in Newton-Raphson method.

Iteration Number	X _i	$f(x_i)$	$ \epsilon_a $ %
0	0.019990	-1.60000×10^{-6}	
1	-2.6480	18.778	100.75
2	-1.7620	-5.5638	50.282
3	-1.1714	-1.6485	50.422
4	-0.77765	-0.48842	50.632
5	-0.51518	-0.14470	50.946
6	-0.34025	-0.042862	51.413
7	-0.22369	-0.012692	52.107
8	-0.14608	-0.0037553	53.127
9	-0.094490	-0.0011091	54.602



Figure 4 Pitfall of division by zero or a near zero number.