24-311 NUMERICAL METHODS

Carnegie Mellon University

One-Dimensional Optimization
Quadratic Interpolation and Newton's Method

Solve for the value of x that maximizes $f(x) = -0.25x^4 + 1.1x^3 - 1.75x^2 + 2x$ using the **quadratic interpolation**. Employ initial guesses of $x_0 = 1.75$, $x_1 = 2$ and $x_2 = 2.25$ and perform 4 iterations. Show your iteration results in the following format:

i	x_0	x_1	x_2	x_3
1	1.75	2.0	2.25	
2				
3				
4				

Solve for the value of x that maximizes $f(x) = -0.25x^4 + 1.1x^3 - 1.75x^2 + 2x$ using the **Newton's method**.

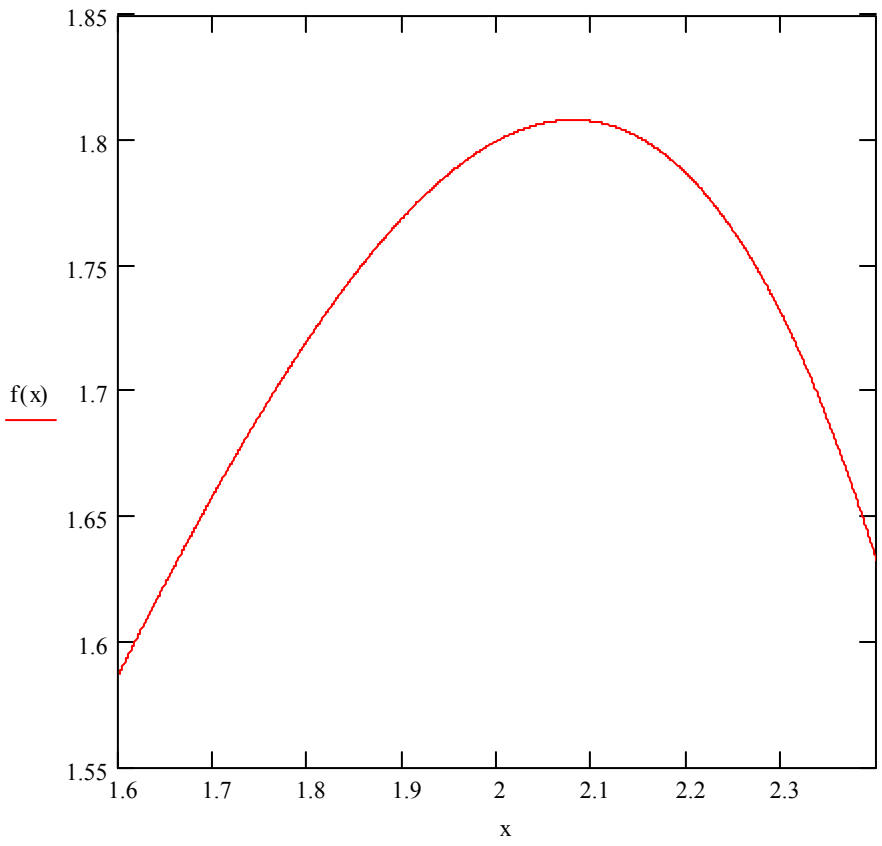
$f'(x) =$

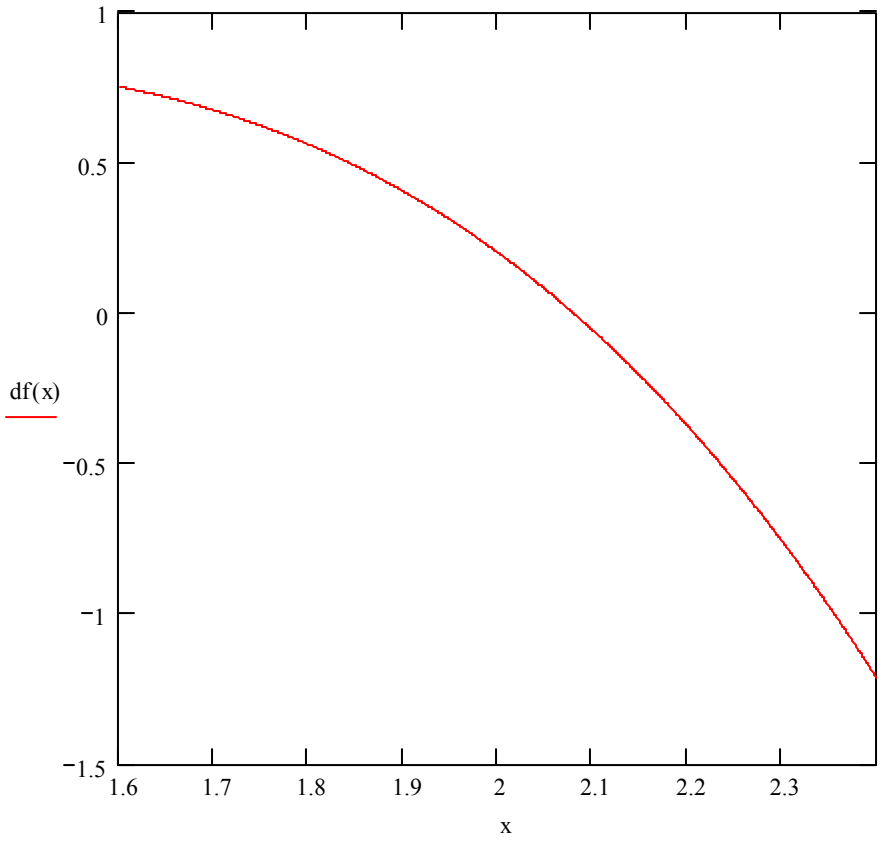
$f''(x) =$

Newton-Raphson formula for $f'(x) = 0$

$x_{i+1} =$

i	x_i	ε_a
0	2.5	
1		
2		
3		


1.85
1.8
1.75
1.7
1.65
1.6
1.55
f(x)
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
x


1
0.5
0
−0.5
−1
−1.5
df(x)
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
x