

M242 Q1(c) (S. Zhang) . Name: _____

1. For finding the root of the equation by doing 2 steps of the Newton's method:

$$f(x) = x^3 - 3 + x, \quad x_1 = 1$$

• **ans:**

$$f(x) = x^3 - 3 + x$$

$$f'(x) = 3x^2 + 1$$

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

x_i	$f(x_i)$	$f'(x_i)$
1	-1	4
1.25	0.203125	5.6875
1.214285714	0.004737609	5.42346

$$\begin{aligned}x_1 &= 1, \\f(x_1) &= -1 \quad f'(x_1) = 4 \\x_{n+1} &= x_n - \frac{f(x_n)}{f'(x_n)} \\x_2 &= 1 - \frac{-1}{4} \\x_2 &= 1.25 \\x_3 &= 1.214285714\end{aligned}$$

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f:=x->x^3-3+x: g:=x->3x^2+1:
t:=1: x1:=t:
evalf([t,f(t),g(t)]); t:=t-f(t)/g(t):
x2:=t:
evalf([t,f(t),g(t)]); t:=t-f(t)/g(t):
x3:=t:
evalf([t,f(t),g(t)]); t:=t-f(t)/g(t):
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