Tomorrow Test Review

Wed Quiz Section 23.6

Thurs Test

Ch 23 (6 Questions)

Bring calculator, music/earplugs

Practice Questions on website

24.2 Newton's Method

Approximate a solution to $f(x) = 0$.

x_0 : a reasonable starting point

x_1 : closer to solution

x_2 : even closer

$\vdots$

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

new x-value

old x-value

Ex: Find a root of $x^3+4x-18=0$ between 1 and 3.

$f(x)$

1) Choose x_0

x	$f(x)=x^3+4x-18$
1	-13
→ 2	-2
3	21

Want $f(x)\approx 0$

$x_0=2$

2) $f(x)=x^3+4x-18$

$f'(x)=3x^2+4$

3) Table

x_n	$f(x_n)$	$f'(x_n)$	$x_n-\frac{f(x_n)}{f'(x_n)}$
2	-2	16	2.125 (2.13)
2.125	0.0957	17.5469	2.1195 (2.12)

2.1195	-0.0006	17.4768	2.1195 (2.12)

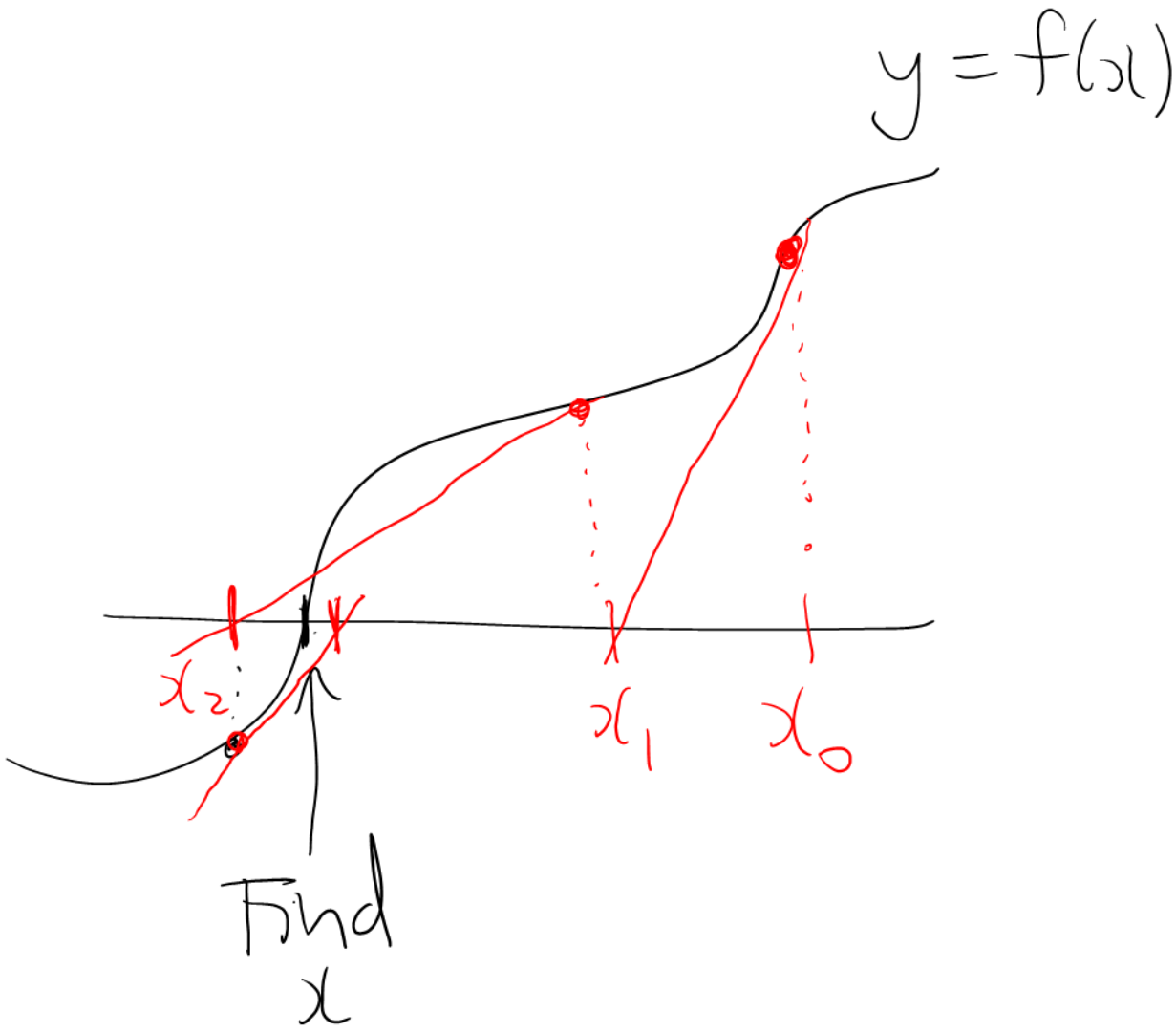
Table to 4 decimal places
Answer to 2 decimal places

Stop when x-values agree to 2 decimal places.

$$x \approx 2.12$$

Check: $2.12^3 + 4(2.12) - 18$

≈ 0 ?

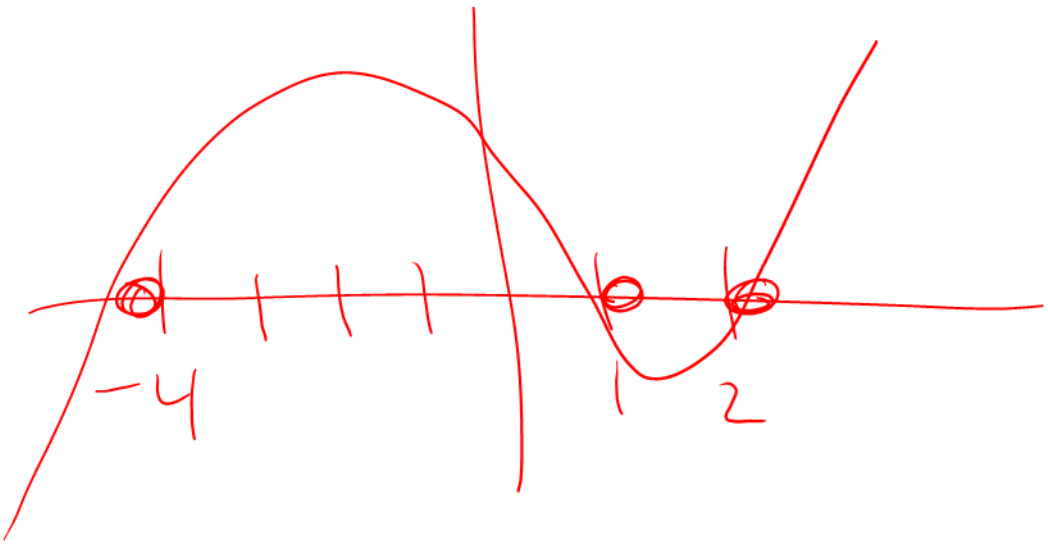


Ex: Approximate the smallest solution to

$$x^3 + x^2 - 11x + 7 = 0$$

furthest left on number line

Wolfram Alpha



$$x_0 = -4$$

$$f(x) = x^3 + x^2 - 11x + 7$$

$$f'(x) = 3x^2 + 2x - 11$$

x_n	$f(x_n)$	$f'(x_n)$	$x_n - \frac{f(x_n)}{f'(x_n)}$
-4	3	29	-4.1034 (-4.10)
-4.1034	-0.1173	31.3069	-4.0997 (-4.10)

$x \approx -4.10$

Comment

Must have $f(x) = 0$

~~$7\sqrt{x} - 12x = 3$~~

$7\sqrt{x} - 12x - 3 = 0$

$f(x)$