(3) $\underbrace{3x^2-5x-1}_{f(x)}=0$ Goal: Find x_3.

x	$f(x)$
-1	7
0	-1

choose $x_0 = 0$

$f(x) = 3x^2-5x-1$ $f'(x) = 6x-5$

x_n	$f(x_n)$	$f'(x_n)$	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$
$x_0 = 0$	-1	-5	-0.2
$x_1 = -0.2$	0.12	-6.2	-0.1806
$x_2 = -0.1806$	0.0008	-6.0836	-0.1805
$x_3 = -0.1805$			

Compare with Quadratic Formula:

$$3x^2-5x-1=0$$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{5 \pm \sqrt{37}}{6}$$

$$x \approx -0.18, 1.85$$

5 $\underbrace{x^3-6x^2+10x-4}_{f(x)}=0$

x	$f(x)$
0	-4
1	1

Choose $x_0=1$

$f(x)=x^3-6x^2+10x-4$ $\quad f'(x)=3x^2-12x+10$

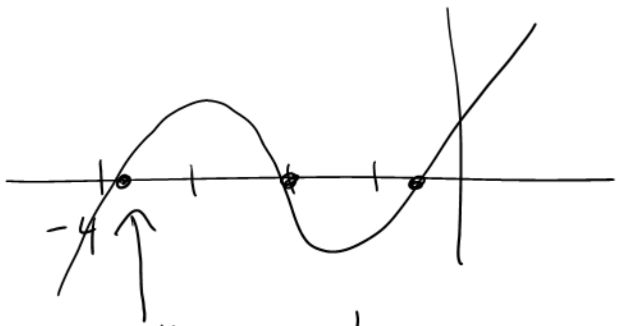
x_n	$f(x_n)$	$f'(x_n)$	$x_{n+1}=x_n-\frac{f(x_n)}{f'(x_n)}$	
$x_0=1$	1	1	0	
$x_1=0$	-4	10	0.4	
$x_2=0.4$	-0.8960	5.6800	0.5577	(0.56)
$x_3=0.5577$	-0.1157	4.2407	0.5850	(0.59)
$x_4=0.5850$	-0.0031	4.0067	0.5858	(0.59)

$x\approx 0.59$

7) $\underbrace{x^3+6x^2+9x+2}_{f(x)}=0$

Since we want the smallest root, let's use Wolfram Alpha to estimate the roots.

Plot $y=x^3+6x^2+9x+2$



Use $x_0=-4$

$f(x)=x^3+6x^2+9x+2$ $\qquad f'(x)=3x^2+12x+9$

x_n	$f(x_n)$	$f'(x_n)$	$x_{n+1}=x_n-\dfrac{f(x_n)}{f'(x_n)}$	
$x_0=-4$	-2	9	-3.7778	(-3.78)
$x_1=-3.7778$	-0.2855	6.4817	-3.7338	(-3.73)
$x_2=-3.7338$	-0.0105	6.0182	-3.7321	(-3.73)

$x\approx-3.73$

⑨ $\underbrace{x^4 - x^3 - 3x^2 - x - 4}_{f(x)} = 0$

x	$f(x)$
2	-10
3	20

Choose $x_0 = 2$

$f(x) = x^4 - x^3 - 3x^2 - x - 4 \qquad f'(x) = 4x^3 - 3x^2 - 6x - 1$

x_n	$f(x_n)$	$f'(x_n)$	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$	
2	-10	7	3.4286	(3.43)
3.4286	55.1883	104.3794	2.8999	(2.90)
2.8999	14.2037	53.9182	2.6365	(2.64)
2.6365	2.5017	35.6342	2.5663	(2.57)
2.5663	0.1487	31.4500	2.5616	(2.56)
2.5616	0.0015	31.1798	2.5616	(2.56)

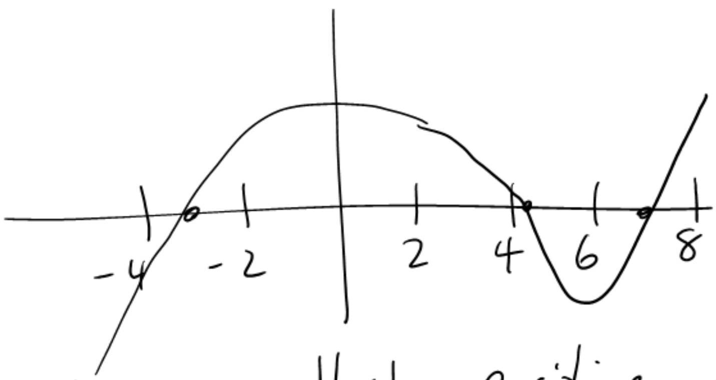
$x \approx 2.56$

(25) Solve $0.00926h^3 - 0.0833h^2 + 0.786 = 0$

or $\underbrace{0.00926x^3 - 0.0833x^2 + 0.786}_{f(x)} = 0$

Use Wolfram Alpha to plot

$$y = 0.00926x^3 - 0.0833x^2 + 0.786$$



We want the smallest positive root.

Choose $x_0 = 4$

$f(x) = 0.00926x^3 - 0.0833x^2 + 0.786$

$f'(x) = 0.02778x^2 - 0.1666x$

x_n	$f(x_n)$	$f'(x_n)$	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$	
4	0.0458	-0.2219	4.2064	(4.21)
4.2064	0.0013	-0.2093	4.2126	(4.21)

$x \approx 4.21$

(29) Volume is initially $2 \times 2 \times 4 = 16 \text{ cm}^3$

Double the volume is 32 cm^3

Let x be the amount by which each edge increases.

We want to solve $(2+x)(2+x)(4+x) = 32$

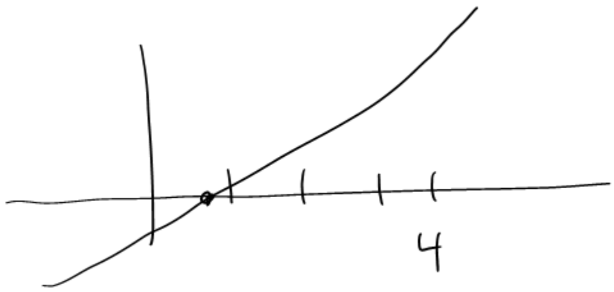
Expand: $(4+4x+x^2)(4+x) = 32$

$$16+4x+16x+4x^2+4x^2+x^3 = 32$$

$$\underbrace{x^3+8x^2+20x-16}_{f(x)} = 0$$

Use Wolfram Alpha

Plot $y = x^3+8x^2+20x-16$ between $x=0$ and $x=4$



Choose $x_0 = 1$

$f(x) = x^3+8x^2+20x-16$

$f'(x) = 3x^2+16x+20$

x_n	$f(x_n)$	$f'(x_n)$	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$	
1	13	39	0.6667	(0.63)
0.6667	1.1863	32.0007	0.6296	
0.6296	0.0127	31.2628	0.6292	(0.63)

$\boxed{x \approx 0.63}$