$f(x) = 4x - 1.8x^2 + 1.2x^3 - 0.3x^4$

a) $x_L = -2, \quad x_u = 4$

$$d = (\phi - 1)(x_u - x_L) = -3 + 3\sqrt{5}$$

$$x_1 = -2 + d = -5 + 3\sqrt{5}$$
$$x_2 = 4 - d = 7 - 3\sqrt{5}$$

$f(x_1) \approx 5, \quad f(x_2) \approx 1.04$

$x_u = x_2 = 7 - 3\sqrt{5}$

$$d = (\phi - 1)(x_u - x_L) = 6\sqrt{5} - 12$$
$$x_1 = -2 + 6\sqrt{5} - 12 = 6\sqrt{5} - 14$$
$$x_2 = 4 - 6\sqrt{5} + 12 = 16 - 6\sqrt{5}$$

$f(x_1) \approx -3,221$

$f(x_2) \approx 5.65$

x1	x2	xl	xu	min
1.708204	0.291796	-2.000000	4.000000	1.041562
0.291796	-0.583592	-2.000000	1.708204	-3.220722
-0.583592	-1.124612	-2.000000	0.291796	-8.961705
-1.124612	-1.458980	-2.000000	-0.583592	-14.753499
-1.458980	-1.665631	-2.000000	-1.124612	-19.510595
-1.458980	-1.665631	-2.000000	-1.458980	-19.510595

b) $f(x) = 4x - 1.8x^2 + 1.2x^3 - 0.3x^4$

$x_1 = 1.75,\ x_2 = 2,\ x_3 = 2.5$

$$x_4 = 2 - \frac{1}{2}\,\frac{(.25)^2\left[5.6 - \frac{135}{32}\right] - (-.5)^2\left[5.6 - \frac{13069}{2560}\right]}{.25\left[5.6 - \frac{135}{32}\right] - (-.5)\left[5.6 - \frac{13069}{2560}\right]}$$

$x_4 = 2.334058$

$x_1 = 1.75,\ x_2 = 2,\ x_3 = 2.334058$

$$x_4 = 2 - \frac{1}{2}\,\frac{(.25)^2(-.28515129) - (-0.334058)^2(.494922)}{(.25)(-.28515129) - (-0.334058)(.494922)}$$

$x_4 = 2.388393$

i	x1	f(x1)	x2	f(x2)	x3	f(x3)	x4	f(x4)
1	1.750000	5.105078	2.000000	5.600000	2.500000	5.781250	2.334058	5.885151
2	1.750000	5.105078	2.000000	5.600000	2.334058	5.885151	2.388393	5.872767
3	1.750000	5.105078	2.000000	5.600000	2.388393	5.872767	2.369688	5.879263
4	1.750000	5.105078	2.000000	5.600000	2.369688	5.879263	2.376022	5.877331
5	1.750000	5.105078	2.000000	5.600000	2.376022	5.877331	2.373865	5.878019