12 $6.33x - 0.113y = 6.10$

$10.2x + 0.182y = 10.6$

$$\left(\begin{array}{cc|c} 6.33 & -0.113 & 6.10 \\ 10.2 & 0.182 & 10.6 \end{array}\right)$$

max Pivot

$$\Rightarrow \left(\begin{array}{cc|c} 10.2 & 0.182 & 10.6 \\ 6.33 & -0.113 & 6.10 \end{array}\right)$$

$m_{21} = \frac{6.33}{10.2} = 0.621$

$$\Rightarrow \left(\begin{array}{cc|c} 10.2 & 0.182 & 10.6 \\ 0 & -0.226 & -0.480 \end{array}\right)$$

$y = \frac{-0.480}{-0.226} = 2.12$

$10.2x + 0.386 = 10.6$

$10.2x = 10.214$

$x = 1$

جامعة بيرزيت
BIRZEIT UNIVERSITY
حمزة محمد عمر الحسن
بكالوريوس
Hamza Mohammad Omar Alhasan
Bachelor

Student Card
بطاقة طالب
Issue Year 2018
1181636

[11] $f(x,y) = 3x^2 - y^3 - x$

$g(x,y) = 2y^2 - 2x - y$

$(x_0, y_0) = (1.2, 3.4)$

$f_x = 6x - 1$

$f_y = -3y^2$

$g_x = -2$

$g_y = 4y - 1$

$$J(x,y) = \begin{pmatrix} 6x-1 & -3y^2 \\ -2 & 4y-1 \end{pmatrix}$$

$$J(x_0, y_0) = \begin{pmatrix} 6.2 & -34.68 \\ -2 & 12.6 \end{pmatrix}$$

$$|J(x_0, y_0)| = 8.76$$

$$J^{-1}(x_0, y_0) = \begin{pmatrix} 1.438356 & 3.958904 \\ 0.228311 & 0.707763 \end{pmatrix}$$

$$\begin{pmatrix} x_1 \\ y_1 \end{pmatrix} = \begin{pmatrix} x_0 \\ y_0 \end{pmatrix} - J^{-1}(x_0, y_0) \begin{pmatrix} f(x_0, y_0) \\ g(x_0, y_0) \end{pmatrix}$$

$$= \begin{pmatrix} 1.2 \\ 3.4 \end{pmatrix} - J^{-1}(x_0, y_0) \begin{pmatrix} -36.184 \\ 17.32 \end{pmatrix}$$

$$= \begin{pmatrix} -15.3227397 \\ -0.5972603 \end{pmatrix}$$

[3] $g(x) = \sqrt[3]{2x+5}$ has P in $[2,3]$

$2 < x < 3$

$4 < 2x < 6$

$\sqrt[3]{9} < \sqrt[3]{2x+5} < \sqrt[3]{11}$

$2 < 2.08 < g(x) < 2.223 < 3$

$\Rightarrow g(x) \in [2,3] \Rightarrow \exists P$ s.t $g(P) = P$ in $[2,3]$

[4] $g'(x) = \frac{2}{3(2x+5)^{2/3}}$

Note that $g'(x)$ is decreasing

$\Rightarrow \max(g'(x)) = g'(2) = 0.15408 < 1$

$\Rightarrow \exists!$ P in $[2,3]$ and P is attractive

and F.P.I converges

[5] $P=2$, $g(x) = \frac{2}{x} + 1$

$|g'(x)| = \left|\frac{-2}{x^2}\right| = \frac{2}{x^2}$, $|g'(2)| = \frac{1}{2} < 1$

$\Rightarrow$ FPI conv. and P is attractive

[6] $P=3$, $f(x) = x^3 - 7x^2 + 15x - 9$

$P_0 = 3.2$, Find P_1, P_2

$f'(x) = 3x^2 - 14x + 15$

$P_{n+1} = P_n - \frac{x^3 - 7x^2 + 15x - 9}{3x^2 - 14x + 15}$

$n=0$: $P_1 = 3.104348$

$n=1$: $P_2 = 3.053449$

[7] $f(P) = f(3) = 0$, $f'(P) = f'(3) = 0$

$f''(x) = 6x - 14$, $f''(P) = f''(3) = 4 \neq 0$

$\Rightarrow \boxed{M=2} \Rightarrow R=1 \Rightarrow A = \frac{M-1}{M} = \frac{1}{2}$

2 FPM, $a_0 = 4$, $b_0 = 5$

$f(x) = x^3 - 7x^2 + 15x - 19$

$c_0 = 4.6154$

Find c_1.

$f(4) = -7$, $f(5) = 6$, $f(4.6154) = -0.56555$

$$c_1 = b_1 - \left(\frac{b_1 - a_1}{f(b_1) - f(a_1)} \right) f(b_1)$$

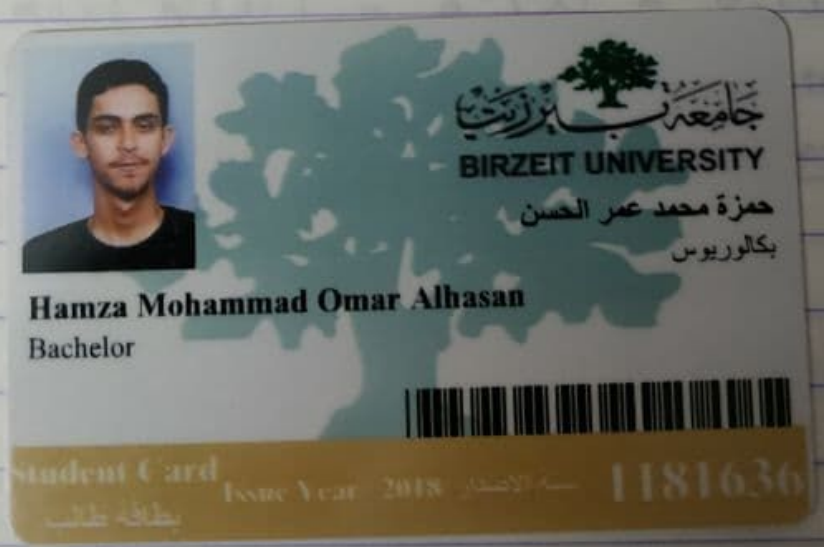
$\Rightarrow a_1 = c_0 = 4.6154$

$b_1 = 5$

$$= 5 - \left(\frac{5 - 4.6154}{6 + 0.56555} \right) \times 6$$

$c_1 = 4.6485$

$f(c_1) = -0.084581$



1) $a_0 = 4, \; b_0 = 5 \;\Rightarrow\; x^3 - 7x^2 + 15x = 19$

$c_0 = 4.5 \;\Rightarrow\; f(x) = x^3 - 7x^2 + 15x - 19$

c_1, c_2

$f(a_0) = f(4) = -7$

$f(b_0) = f(5) = 6$

$f(c_0) = f(4.5) = -2.125$

$f(a_1) = f(4.5) = -2.125$

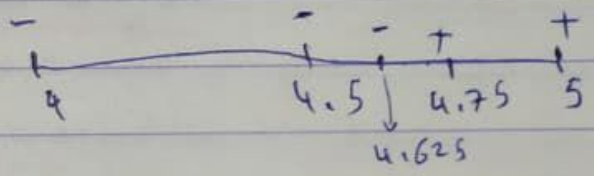
$f(b_1) = f(5) = 6$

$f(c_1) = f(4.75) = 1.4844$

$f(a_2) = f(4.5) = -2.125$

$f(b_2) = f(4.75) = 1.4844$

$f(c_2) = f(4.625) = -0.42773$



[8] $p=2$, $g(x) = \frac{x}{2} + \frac{2}{x} \Rightarrow g(2) = 2$

$g'(x) = \frac{1}{2} - \frac{2}{x^2} \Rightarrow g'(2) = 0$

$g''(x) = \frac{4}{x^3} \Rightarrow g''(2) = \frac{1}{2} \neq 0$

$k = 2 \Rightarrow \boxed{R = 2}$

$A = \left| \frac{g''(2)}{2} \right| = \frac{1}{4}$

[9] A_{mm} : $3A^3 - 2A$

cost $(AA) = 2n^3 - n^2$

Let $AA = B$

cost $(AB) = 2n^3 - n^2$

Let $C = AB = A^3$

cost $(3C) = 3n^2$

cost $(2A) = n^2$

~~cost $(3A^3 - 2A)$~~

cost (substract) $= n^2$

Total cost $= 2n^3 - n^2 + 2n^3 - n^2 + 3n^2$

$= 4n^3 + n^2 = \boxed{4n^3 + n^2}$

[10] $x = g_1(x,y,z) = 3x^2 - 2y^3 + 2z$

$y = g_2(x,y,z) = 10 - 2xy - z^2$

$z = g_3(x,y,z) = 10z - 2xy$

$(x_0, y_0, z_0) = (3, 2, 4)$

$x_1 = g_1(x_0, y_0, z_0)$

$y_1 = g_2(x_1, y_0, z_0)$

$z_1 = g_3(x_1, y_1, z_0)$

$\Rightarrow x_1 = 19$

$y_1 = -82$

$z_1 = 3156$