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Institución Curso Nota

1.) Parábola $y = A + Bx + Cx^2$ que pasa por los puntos $(1,1)$, $(2,-1)$, $(3,1)$. A, B y C son:

$$\left.\begin{matrix} A + B(1) + C(1)^2 = 1 \\ A + B(2) + C(2)^2 = -1 \\ A + B(3) + C(3)^2 = 1 \end{matrix}\right\} \quad \left.\begin{matrix} 1A + 1B + 1C = 1 \\ 1A + 2B + 4C = -1 \\ 1A + 3B + 9C = 1 \end{matrix}\right\} \left(\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 1 & 2 & 4 & -1 \\ 1 & 3 & 9 & 1 \end{array}\right) \begin{matrix} F_2 - F_1 \\ F_3 - F_1 \end{matrix} \left(\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 0 & 1 & 3 & -2 \\ 0 & 2 & 8 & 0 \end{array}\right)$$

$$\begin{matrix} F_1 - F_2 \\ \\ F_3 - 2F_2 \end{matrix} \begin{pmatrix} 1 & 0 & -2 & 3 \\ 0 & 1 & 3 & -2 \\ 0 & 0 & 2 & 4 \end{pmatrix} F_3/2 \left(\begin{array}{ccc|c} 1 & 0 & -2 & 3 \\ 0 & 1 & 3 & -2 \\ 0 & 0 & 1 & 2 \end{array}\right) \begin{matrix} F_1 + 2F_3 \\ F_2 - 3F_3 \end{matrix} \left(\begin{array}{ccc|c} 1 & 0 & 0 & 7 \\ 0 & 1 & 0 & -8 \\ 0 & 0 & 1 & 2 \end{array}\right) \quad \begin{matrix} A = 7 \\ B = -8 \\ C = 2 \end{matrix} \; //$$

2.) A es la matriz de elementos: $a_{11} = 4$, $a_{12} = 3$, $a_{13} = -1$, $a_{21} = -2$, $a_{22} = -4$, $a_{23} = 5$, $a_{31} = 1$, $a_{32} = 2$, $a_{33} = 6$

Factorizar $A = LU$.

elementos de L: ?

$$A = \begin{pmatrix} 4 & 3 & -1 \\ -2 & -4 & 5 \\ 1 & 2 & 6 \end{pmatrix}, \quad \begin{matrix} m_{21} = -2/4 = -1/2 \\ m_{31} = 1/4 = 1/4 \end{matrix} \quad \begin{matrix} F_2 + \frac{1}{2}F_1 \\ F_3 - \frac{1}{4}F_1 \end{matrix} \begin{pmatrix} 4 & 3 & -1 \\ 0 & -5/2 & 9/2 \\ 0 & 5/4 & 25/4 \end{pmatrix}, \quad m_{32} = 2/-4 = -1/2$$

$$F_3 + \frac{1}{2}F_2 \begin{pmatrix} 4 & 3 & -1 \\ 0 & -\frac{5}{2} & 9/2 \\ 0 & 0 & 17/2 \end{pmatrix} = U, \quad L = \begin{pmatrix} 1 & 0 & 0 \\ -1/2 & 1 & 0 \\ 1/4 & -1/2 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ -0{,}5 & 1 & 0 \\ 0{,}25 & -0{,}5 & 1 \end{pmatrix} //$$

3.) Raíz de la ecuación por método de la secante:

$$f(x) = x^3 + 2x^2 + 10x - 20 = 0, \quad x_0 = 0, \quad x_1 = 1, \quad x_{n+1} = x_n - \frac{f(x_n)(x_n - x_{n-1})}{f(x_n) - f(x_{n-1})}$$

1. $x_0 = 0$, $f(x_0) = -20$
   $x_1 = 1$, $f(x_1) = -7$
   $x_1 - x_0 = 1$
   $f(x_1) - f(x_0) = 13$

   $x_2 = 1 - \frac{(-7)(1)}{13} = 1 + \frac{7}{13} = \frac{20}{13}$

   $x_2 \approx 1{,}53846$

2. $x_1 = 1$, $f(x_1) = -7$
   $x_2 = 1{,}53846$, $f(x_2) = 3{,}75963$
   $x_2 - x_1 = 0{,}53846$
   $f(x_2) - f(x_1) = 10{,}75963$

   $x_3 = 1{,}53846 - \frac{3{,}75963(0{,}53846)}{10{,}75963}$

   $x_3 \approx 1{,}35031$ //

4.) raíz de $f(x)=x^3+2x^2+10x-20=0$ por Newthon raphson. obtener x_3. $x_0=1$

$$x_r = x_{r-1} - \frac{f(x_{r-1})}{f'(x_{r-1})} \quad , \quad f'(x)=3x^2+4x+10$$

1. $x_0=1$
   $f(x_0)=-7$
   $f'(x_0)=17$

   $x_1=1-\frac{(-7)}{17}$

   $x_1=1+\frac{7}{17}=\frac{24}{17}$

   $x_1\simeq 1,41176$

2. $x_1=1,41117$
   $f(x_1)=0,91746$
   $f'(x_1)=21,62623$

   $x_2=1,41117-\frac{0,91746}{21,62623}$

   $x_2=1,36933$

3. $x_2=1,36933$
   $f(x_2)=0,01101$
   $f'(x_2)=21,10251$

   $x_3=1,36933-\frac{0,01101}{21,10251}$

   $x_3=1,368808$

   $x_3=1,36881$ //

5) $y=f(x)=\cos(x)$, $x_0=0,2$, $x_1=1,0$. obtener polinomio de Lagrange.

$$P_N(x)=\sum_{r=0}^{N} y_r \frac{\prod_{j=0,\, j\neq r}(x-x_j)}{\prod_{j=0,\, j\neq r}(x_r-x_j)} \quad , \quad N=1$$

$$P_1(x)=y_0\frac{(x-x_1)}{(x_0-x_1)}+y_1\frac{(x-x_0)}{(x_1-x_0)} \;;\; y_0=\cos(0,2)=0,98007,\; y_1=\cos(1)=0,540300$$

$$P_1(x)=0,98007\frac{(x-1)}{-0,8}+0,54030\frac{(x-0,2)}{0,8}$$

$$P_1(x)=-1.22508(x-1)+0,675378(x-0,2) \;//$$

6) Oscilación de aceleración:

x_0	x_1	x_2	x_3
1	5	20	40
56.5	113	181	214.5

, hallar PIN grado 3:

$$P_N(x)=\sum_{r=0}^{N} a_r \prod_{i=0}^{r-1}(x-x_i)$$

x	$f(x)$	Δf	$\Delta^2 f$	$\Delta^3 f$
1	56.5			
5	113	14.125		
20	181	4.5333	-0,50482	
40	214.5	1.675	-0,081666	0,010850

$$P_3(x)=56.5+14.125(x-1)-0,50482(x-1)(x-5)+0,010850(x-1)(x-5)(x-20) \;//$$

7.) mezcla para construir aceras.

Cemento, arena, grava: proporciones.

x_1:	$1/8$	$3/8$	$4/8$	m^3	P_1
x_2:	$2/10$	$5/10$	$3/10$	m^3	P_2
x_3:	$2/5$	$3/5$	$0/5$	m^3	P_3
	x_1	x_2	x_3		

Total:

$2,3 \quad 4,8 \quad 2,9 \quad m^3$

$$P_1: \left.\begin{array}{l} 1/8\,x_1 + 2/10\,x_2 + 2/5\,x_3 = 2,3 \\ 3/8\,x_1 + 5/10\,x_2 + 3/5\,x_3 = 4,8 \\ 4/8\,x_1 + 3/10\,x_2 + 0/5\,x_3 = 2,9 \end{array}\right\} \left(\begin{array}{ccc|c} 1/8 & 1/5 & 2/5 & 2,3 \\ 3/8 & 1/2 & 3/5 & 4,8 \\ 1/2 & 3/10 & 0 & 2,9 \end{array}\right) F_1(8)$$

$$\left(\begin{array}{ccc|c} 1 & 8/5 & 16/5 & 92/5 \\ 3/8 & 1/2 & 3/5 & 24/5 \\ 1/2 & 3/10 & 0 & 29/10 \end{array}\right) \begin{array}{l} F_2 - \frac{3}{8}F_1 \\ F_3 - \frac{1}{2}F_1 \end{array} \left(\begin{array}{ccc|c} 1 & 8/5 & 16/5 & 92/5 \\ 0 & -1/10 & -3/5 & -21/10 \\ 0 & -1/2 & -8/5 & -63/10 \end{array}\right) F_2(-10) \left(\begin{array}{ccc|c} 1 & 8/5 & 16/5 & 92/5 \\ 0 & 1 & 6 & 21 \\ 0 & -1/2 & -8/5 & -63/10 \end{array}\right)$$

$$F_3 + \frac{1}{2}F_2 \left(\begin{array}{ccc|c} 1 & 8/5 & 16/5 & 92/5 \\ 0 & 1 & 6 & 21 \\ 0 & 0 & 7/5 & 21/5 \end{array}\right) F_3(5/7) \left(\begin{array}{ccc|c} 1 & 8/5 & 16/5 & 92/5 \\ 0 & 1 & 6 & 21 \\ 0 & 0 & 1 & 3 \end{array}\right) F_2 - 6F_3 \left(\begin{array}{ccc|c} 1 & 8/5 & 16/5 & 92/5 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 3 \end{array}\right)$$

$$F_1 - \frac{16}{5}F_3 \left(\begin{array}{ccc|c} 1 & 8/5 & 0 & 44/5 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 3 \end{array}\right) F_1 - 8/5\,F_2 \left(\begin{array}{ccc|c} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 3 \end{array}\right) \therefore \begin{array}{l} x_1 = 4 \\ x_2 = 3 \\ x_3 = 3 \end{array}$$