

# Segundo Examen Parcial

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1. Resuelve el siguiente sistema de ecuaciones que se representa en su forma matricial, usando el método de Jacobi o Gauss-Seidel, escribe la fórmula para tus variables, y realiza al menos 3 iteraciones.

$$\begin{pmatrix} -5 & 5 & 3 \\ 5 & 6 & 1 \\ 3 & 1 & 7 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$$

$$\begin{pmatrix} -5x & 5y & 3z \\ 5x & 6y & z \\ 3x & y & 7z \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$$

$$\begin{pmatrix} x = \frac{1 - 5y - 3z}{-5} \\ y = \frac{2 - 5x - z}{6} \\ z = \frac{3 - 3x - y}{7} \end{pmatrix}$$

3x3 System:

$$\begin{aligned} [-5 \ 5 \ 3] &= 1 \\ [5 \ 6 \ 1] &= 2 \\ [3 \ 1 \ 7] &= 3 \end{aligned}$$

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x[0] = [-0.2, 0.5, 0.44285714285714284]
x[1] = [0.5657142857142856, -0.21190476190476185, 0.21639455782312927]
x[2] = [-0.2820680272108843, 0.5323242630385487, 0.4734114026563006]
x[3] = [0.616371104632329, -0.259211154302991, 0.20144254862942915]
x[4] = [-0.33834562512533356, 0.5817142628328732, 0.4904746589347325]
x[5] = [0.6759990581937128, -0.3117449916505494, 0.18339254529563015]
x[6] = [-0.40170946447317135, 0.6375257961783711, 0.5096575138915919]
x[7] = [0.7433203045133262, -0.37104317274303716, 0.16301175131472262]
x[8] = [-0.4732361219542036, 0.7005281430760492, 0.5313114603980802]
x[9] = [0.8193150193148973, -0.4379810928287612, 0.14000514784058135]
x[10] = [-0.5539780041244124, 0.7716474787969135, 0.5557552190823319]
x[11] = [0.9051006102463126, -0.5135430450523158, 0.11403445918762545]
x[12] = [-0.6451223695397407, 0.8519295647518463, 0.5833482205524823]
x[13] = [1.0019384970833358, -0.598840117661527, 0.0847178037730742]
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**¡EL MÉTODO DIVERGE!**

2. Construye polinomio de aproximación de Hermite para los siguientes datos.

x	f(x)	f'(x)
8.3	17.5649	3.1162
8.6	18.5051	3.1517

2 points:

$$\begin{aligned} f(8.3) &= 17.5649 & f'(8.3) &= 3.1162 \\ f(8.6) &= 18.5051 & f'(8.6) &= 3.1517 \end{aligned}$$

Polynomial

$$17.5649 + 3.1162(x-8.3) + 0.059333333333334033(x-8.3)(x-8.3) - 0.0011111111111578535(x-8.3)(x-8.3)(x-8.6)$$

Simplified

$$-0.0011111111111578535x^3 + 0.087333333333451824x^2 + 1.8960999999899908x - 3.5538044444162686$$

By Powers

$$-0.0011111111111578535x^3 + 0.0873333333334518238x^2 + 1.8960999999899908x - 3.5538044444162685$$

3. Considera la siguiente ecuación:  $2 + \frac{x}{2} - \frac{x^2}{4} = 0$ .

a. Manipula algebraicamente y escribe al menos dos funciones para usar la iteración de punto fijo.

i.  $2 + \frac{3x}{2} - \frac{x^2}{4} = x$

ii.  $\frac{x}{2} = \frac{x^2}{4} - 2; \quad x = \frac{x^2}{2} - 4$

b. Usa  $g(x) = 2 + \frac{x}{2} - \frac{x^2}{4}$  para aproximar una raíz tomando  $x_0 = 1$ .

$$x = -x^2/4 + x/2 + 2$$

1. P = 2.25000000000000 Er = 55.5555555555556  
 2. P = 1.85937500000000 Er = 21.0084033613445  
 3. P = 2.06536865234375 Er = 9.97369898637666  
 4. P = 1.96624740865082 Er = 5.04113791869909  
 5. P = 2.01659148631890 Er = 2.49649361358650  
 6. P = 1.99163543748598 Er = 1.25304301998225  
 7. P = 2.00416478978049 Er = 0.625165772714831  
 8. P = 1.99791326874127 Er = 0.312902523699613  
 9. P = 2.00104227701753 Er = 0.156368923944784  
 10. P = 1.99947858990589 Er = 0.0782047439531863  
 11. P = 2.00026063707993 Er = 0.0390972636037272  
 12. P = 1.99986966447711 Er = 0.0195499041644994  
 13. P = 2.00006516351461 Er = 0.00977463339998605  
 14. P = 1.99996741718113 Er = 0.00488739629660346  
 15. P = 2.00001629114403 Er = 0.00244367823990332  
 16. P = 1.99999185436164 Er = 0.00122184409590849  
 17. P = 2.00000407280259 Er = 0.000610920803836767

2.00000407280259

4. Obtén el polinomio interpolante de diferencias divididas de Newton usando los siguientes datos: (2, -15); (-3, 15); (5, -153); (-7, 291)  
 Úsala para aproximar el valor si  $x = -4$

**Nota:** Escribe el polinomio interpolante y el valor cuando  $x = -4$

4 points:

$$\begin{aligned} f(2) &= -15 \\ f(-3) &= 15 \\ f(5) &= -153 \\ f(-7) &= 291 \end{aligned}$$

Polynomial

$$-15 + -6.0*(x-2) + -5.0*(x-2)*(x--3) + -1.0*(x-2)*(x--3)*(x-5)$$

Simplified

$$-1.0*x**3 - 1.0*x**2 - 3.0$$

By Powers

$$-1.0*x**3 - 1.0*x**2 - 3.0$$

$$f(-4) \approx 45.00000000000000$$

5. Obtén el polinomio de interpolación de Lagrange usando los siguientes datos: (1, 10); (-4, 10); (-7, 34).  
 Y úsalo para aproximar  $p(-3)$ .

**Nota:** Escribe el polinomio y la interpolación cuando  $x = -3$ .

3 points:

$$\begin{aligned} f(1) &= 10 \\ f(-4) &= 10 \\ f(-7) &= 34 \end{aligned}$$

Polynomial

$$10*(x - -4)/(1 - -4)*(x - -7)/(1 - -7) + 10*(x - 1)/(-4 - 1)*(x - -7)/(-4 - -7) + 34*(x - 1)/(-7 - 1)*(x - -4)/(-7 - -4)$$

Simplified

$$x**2 + 3*x + 6$$

By Powers

$$x**2 + 3*x + 6$$

$$g(-3) \approx 6.00000000000000$$

# CODIGOS