OBEMBE TOMILAYO 18/ENG06/050 MECHANICAL ENGINEERING

D) The set of models of a system is as given in Equation (1). With the aid of MATHCAD, estimate the values of the x's in the model equation.

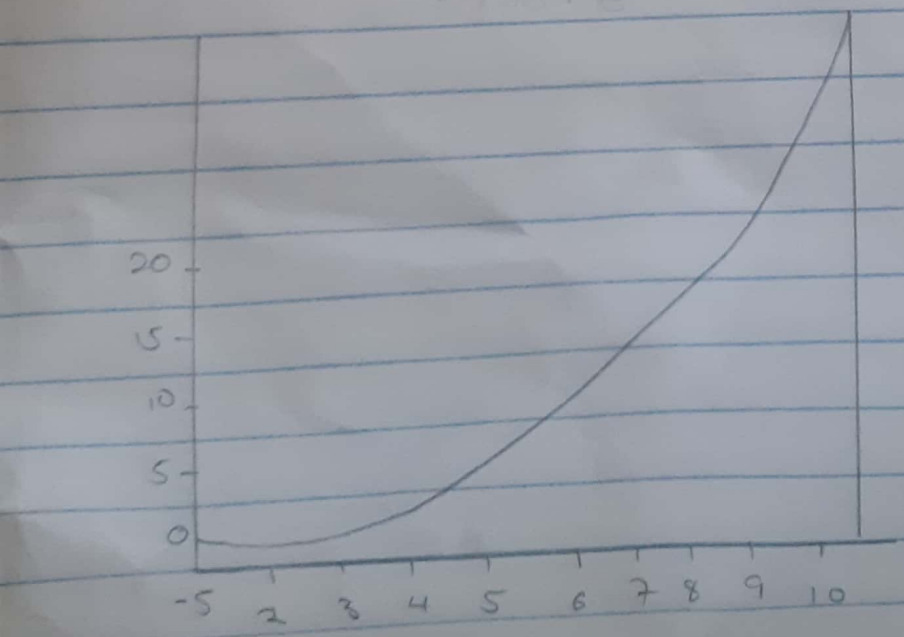
$$\begin{cases} x_1 - 2x_2 - x_3 + 3x_4 = 10 \\ 2x_1 + 3x_2 + x_4 = 8 \\ -x_2 + 3x_3 + x_4 = -7 \end{cases}$$

$$A = \begin{bmatrix} 1 & -2 & -1 & 3 \\ 2 & 3 & 0 & 1 \\ 1 & 0 & -4 & -2 \\ 0 & -1 & 3 & 1 \end{bmatrix}$$

$$C = \begin{bmatrix} 10 \\ 8 \\ -3 \\ -7 \end{bmatrix}$$

$$D = \begin{matrix} 0.0267 & 0.2400 & 0.4933 & 0.6667 \\ -0.0933 & 0.1600 & -0.2267 & -0.333 \\ -0.1067 & 0.0400 & 0.0261 & 0.3333 \\ 0.2267 & 0.0400 & -0.3061 & -0.3333 \end{matrix}$$

$$\varepsilon = \begin{matrix} -1.0000 \\ 2.0000 \\ -3.0000 \\ 4.0000 \end{matrix}$$



2) The model equation of a system has been developed to be $y = \sin(0.25t) + 2t + e^{-0.85t} - 2\cos \pi/10 t$. with the aid of MathCAD, determine its dynamic response in tabular and graphical forms for $0 \leq t \leq 10hr$ with $\Delta t = 0.01$

$y = \sin(0.25t) + 2t + \exp(-0.85t) - 2\cos(Pi\,t/10)$

Plot (t, y)

grid minor

grid on

['t' 'y']

0	-1.0000		
0.1000	-0.8555	2.3000	3.7852
0.2000	-0.7024	2.4000	4.0367
0.3000	-0.5413	2.5000	4.2903
0.4000	-0.3726	2.6000	4.5458
0.5000	-0.1969	2.7000	4.8030
0.6000	-0.0146	2.8000	5.0619
0.7000	-0.1738	2.9000	5.3223
0.8000	-0.3661	3.0000	5.841
0.9000	0.5679	3.1000	5.873
1.0000	07727	3.2000	6.1116
1.1000	0.9824	3.3000	6.3770
1.2000	1.966	3.4000	6.6433
1.3000	1.4150	3.5000	6.9106
1.4000	1.6373	3.6000	7.1787
1.5000	1.8637	3.7000	7.4474
1.6000	2.0935	3.8000	7.7167
1.7000	2.3266	3.9000	7.9866
1.8000	2.5628	4.0000	8.2568
1.9000	2.8021	4.1000	8.5274
2.0000	3.0441	4.2000	8.7982
2.1000	3.2887	4.3000	9.0692
2.2000	3.5358	4.4000	9.3402

4.5000	9.6112	7.800	18.3007
4.6000	9.8821	7.900	18.5284
4.7000	10.1529	8.0000	18.7588
4.8000	10.4234	8.1000	18.9970
4.9000	10.6935	8.2000	19.1979
5.000	10.6633	8.3000	19.4166
5.1000	11.2323	8.4000	19.6331
5.2000	11.5012	8.5000	19.8472
5.3000	12.0365	8.6000	20.0591
5.4000	12.3031	8.7000	20.2086
5.5000	125688	8.8000	20.4758
5.6000	128335	8.9000	20.6808
5.7000	18.0973	9.000	20.883
5.8000	13.3600		
5.9000	13.3600		
6.0000	136216		
6.1000	138820		
6.2000	14.1412		
6.3000	14.3990		
6.4000	14.6555		
6.5000	14.9105		
6.6000	15.9105		
6.7000	15.1640		
6.8000	15.4160		
6.9000	15.6664		
7.0000	16.4074		
7.1000	16.6509		
7.2000	16.8925		
7.3000	17.1322		
7.4000	17.3700		
7.5000	17.6058		
7.6000	17.8396		
7.7000	18.0813		