Unit 76: Management Mathematics   Assignment – 2

Answer all the following questions:

1. Solve the following difference equation**:**   **(5 Marks)**

$$y_{t+2} - 2y_{t+1} + 2y_t = t - 1 \quad \text{with} \quad y_0 = 0 \text{ and } y_1 = 3$$

2. For some **0 < c < 1 , w>0**, the following questions relate to
   income Y_t ,consumption C_t ,production Q_t ,Investment I_t
   and government spending G_t at time t:

$$Y_t = C_t + I_t + G_t$$
$$C_t = C_0 + cY_{t-1}$$
$$I_t = I_0 + w(C_t - C_{t-1})$$
$$G_t = G_0$$

   (a) Derive a second order difference equation for Y in terms
       of **c ,w , I$_0$, C$_0$ and G$_0$** .   **(3 Marks)**
       The required equation should be :
       Y$_t$ – c(1+w)Y$_{t-1}$ + cwY$_{t-2}$ = C$_0$ + I$_0$ + G$_0$

   (b) Show that for the time path to oscillate,the following
       relation holds : **cw^2 + 2(c-2)w + c < 0**   **(3 Marks)**

   (c) Suppose now **c = $\dfrac{1}{8}$, w = 1** and that **I$_0$ + C$_0$ + G$_0$ = 40**

       Solve the difference equation obtained in (a) for
       Y$_0$ = 65 , Y$_1$ = 64.5   **(5 Marks)**

   (d) Produce a graph of **Y$_t$** against **t** and comment upon the
       behaviour of **Y$_t$** as **t** increases.   **(3 Marks)**

3. The sequences y_t and x_t are linked by the following equations
   which holds for all $t \geq 1$:
   y$_t$ – y$_{t-1}$ = 6x$_{t-1}$
               x$_t$ = y$_{t-1}$ + 2
   Obtain a second order difference equation for y_t.
   Find explicit expressions for y_t and x_t given that
   $y_0 = 1$ and $x_0 = 1/6$

                    (6 Marks)

4. a) Briefly discuss how each of the following techniques can help in data reduction:

    i)   Clustering

    ii)   Box Plots   **(4 Marks)**

b) Explain the difference between single linkage and complete linkage in cluster analysis. Under what circumstances would you use one of these techniques in preference to the other?   **(4 Marks)**

c) **(7 Marks)**

Data were collected on seven soybean plants. Five characteristics were measured on each plant. The Euclidean distances between the vectors of measurements are displayed in the following table for all pairs of plants.

	Plant						
	1	2	3	4	5	6	7
Plant 1	--	33	37	24	31	36	39
Plant 2		--	42	22	39	42	35
Plant 3			--	41	45	30	42
Plant 4				--	41	32	40
Plant 5					--	46	48
Plant 6						--	34
Plant 7							--

Use the complete linkage clustering procedure to make three clusters.

5. The doctor of a school has measured the height of pupils in a 5th grade class. The result (in cm) is as follows:

130 132 138 136 131 153 131 133 129 133 110 132 129 134 135
132 135 134 133 132 130 131 134 135 135 134 136 133 133 130

a- Which ones are outliers and why?   **(2 Marks)**

b- The weight of those pupils was measured in kg and the results is as follows:

37 40 39 40.5 42 51 41.5 39 41 30 40 42 40.5 39.5 41
40.5 37 39.5 40 41 38.5 39.5 40 41 39 40.5 40 38.5 39.5 41.5
Draw the box-plot for weight.   **(4 Marks)**

c- Draw the scatter-plot for both variables height and weight.

                                                  (4 Marks)

END of QUESTIONS