٥ الفرقة الثانية

MENOUFIA UNIVERSITY
Menouf, Faculty of Electronic Eng.
Department of Phys. & Eng. Math.
Eng. Math 6, final exam
Second Year

جامعة المنوفية
كلية الهندسة الإلكترونية بمنوف
قسم الفيزيقا والرياضيات الهندسية
الرياضيات الهندسية ٦ (الاختبار النهائي)
الفرقة الثانية

Monday 10/6/2019 — Test time: 90 minutes

Answer the following questions

(k is non-negative integer number.)

1. (a) Determine the z transform of the sequence $\{k(\frac{1}{2})^k\}$.

   (b) Obtain the response of the second-order unforced discrete-time system

$$x(k+1) = \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix} = \begin{bmatrix} \frac{1}{2} & 0 \\ -1 & \frac{1}{2} \end{bmatrix} x(k)$$

   subject to $x(0) = [1 \quad 1]^T$.

2. (a) Find the z-transform of the sequence

$$\{x_k\} = \{0, 1/2, 1, 3/2, 2, \ldots, k/2, \ldots\}$$

   (b) Find a difference equation to represent the system shown in Figure 1, having input and output sequences $\{x_k\}$ and $\{y_k\}$ respectively, where D is the unit delay block and a and b are constant feedback gains. Solve the resulting difference equation at $a = 1$ and $b = 2$.

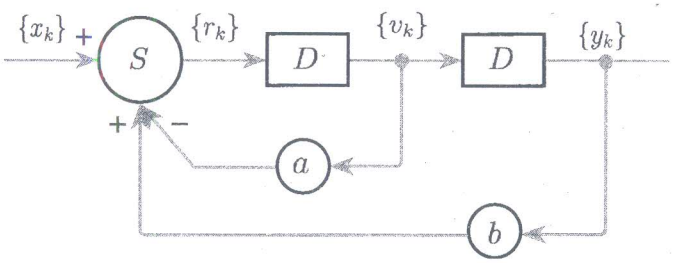

Figure 1

3. (a) For a simple die toss, find the mean, median, mode.

   (b) The lifetime of an electronic component (in thousands of hours) is a continuous random variable with density function

$$f_X(x) = \begin{cases} \frac{1}{2}e^{-x/2} & (x \geqslant 0) \\ 0 & (x < 0) \end{cases}$$

   Find the proportion of components that last longer than 4000 hours.

إقلب الصفحة

4. (a) The number of ships arriving at a container terminal during any one day can be any integer from zero to four, with respective probabilities 0.1, 0.3, 0.35, 0.2, 0.05. Find the variance and standard deviation of these probabilities.

   (b) A machine produces components that have defect A with probability 0.005 and defect B with probability 0.008, the two defects being independent. If 88 components are packed into a batch, what is the (approximate) probability that the batch contains at least 85 components without defects?

Marks of questions

Question	1.a	1.b	2.a	2.b	3.a	3.b	4.a	4.b
Marks	3	10	3	10	3	9	3	9

The full mark is 50

Best wishes *Dr. Hassan M. Abdelhafez*