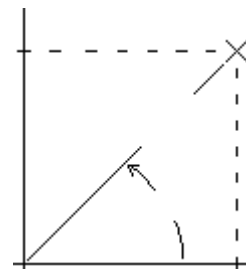


1. Problem 6.3 in the text. Use partial fraction expansions to find the  $x(k)$  whose z-transform is

a)  $\mathbf{X}(z) = \frac{1}{(z-1)(z-2)}$

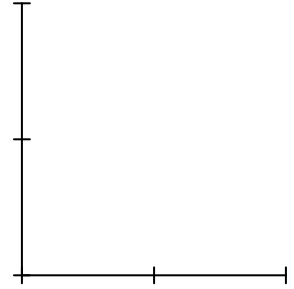
b)  $\mathbf{X}(z) = \frac{z}{z^2 - 2z + 2}$



2. Problem 6.6 in the text.

a) Using partial fraction expansions, find the signal  $x(k)$  whose z-transform is

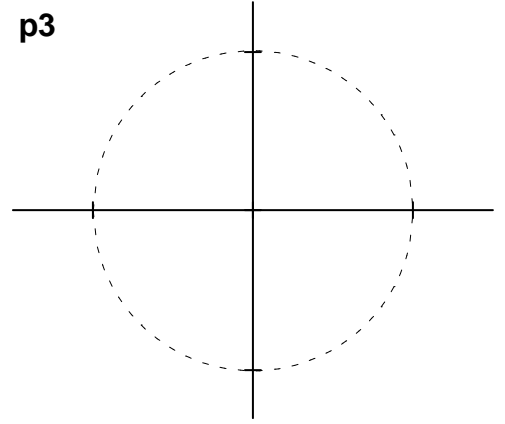
$$\mathbf{X}(z) = \frac{4}{(z-1) \cdot (z^2+1)}$$



b) Using long division, obtain  $x(k)$  for the signal of part a) and  $k=0, \dots, 8$ . Compare the results to those obtained in part a).

3. Using partial fraction expansions, find the signal  $x(k)$  whose z-transform is

$$X(z) = \frac{z^2}{(z+1) \cdot (z^2 - 1.4z + 0.98)}$$



b) Is the signal represented by part b) bounded? Yes No  
Does it converge? Yes No If yes, to what value?

4. Problem 6.8 in the text

Indicate whether the discrete-time systems with the following transfer functions are BIBO stable.

Poles or pole magnitudes      BIBO

a)  $H(z) = \frac{z}{z - 0.5}$

b)  $H(z) = \frac{z^3}{(z^2 + 0.81)^2}$

c)  $H(z) = \frac{z}{(z + 1) \cdot (z + 2)}$

d)  $H(z) = \frac{z - 10}{z^{10}}$

e)  $H(z) = \frac{z + 0.5}{(z + 1) \cdot (z + 0.25)}$

f)  $H(z)$  corresponding to the difference equation:

$$y(k+1) - \frac{1}{2} \cdot y(k) = x(k+1) - 2 \cdot x(k)$$

**Answers**

1. a)  $\left(\frac{1}{2} \cdot \delta(k) - 1 + \frac{1}{2} \cdot 2^k\right) \cdot u(k)$       b)  $\left[\left(\sqrt{2}\right)^k \cdot \sin\left(\frac{\pi}{4} \cdot k\right)\right] \cdot u(k)$

2. (6.6) a)  $x(k) := \left(-4 \cdot \delta(k) + 2 + 2 \cdot \cos\left(\frac{\pi}{2} \cdot k\right) - 2 \cdot \sin\left(\frac{\pi}{2} \cdot k\right)\right) \cdot u(k)$

$x(0) = 0$      $x(1) = 0$      $x(2) = 0$      $x(3) = 4$      $x(4) = 4$      $x(5) = 0$      $x(6) = 0$      $x(7) = 4$      $x(8) = 4$

3. a)  $\left[-0.296 \cdot (-1)^k + 0.98^{\frac{k}{2}} \cdot \left(0.296 \cdot \cos\left(\frac{\pi}{4} \cdot k\right) + 0.71 \cdot \sin\left(\frac{\pi}{4} \cdot k\right)\right)\right] \cdot u(k)$

4. (6.8) a) yes      d) yes

b) yes      e) no

b) Yes    No    N/A

c) no      f) yes