

1. Problem 6.1 (p.186) in the Bodson text. Find  $x(0)$  if the z-transform of  $x(k)$  is

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

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

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

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

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

3. Problem 6.4 in the text. Sketch the time function  $x(k)$  that you would associate with the following poles. Only a sketch is required, but be as precise as possible.

a)  $p_1 = 0.9 \cdot j$ ,  $p_2 = -0.9 \cdot j$       b)  $p_1 = 1$ ,  $p_2 = -1$       c)  $p_1 = 0.3$ ,  $p_2 = 0.9$       d)  $p_1 = e^{j \cdot \frac{\pi}{6}}$ ,  $p_2 = e^{-j \cdot \frac{\pi}{6}}$

4. Problem 6.6 (p.187) in the Bodson text.

5. Problem 6.7 in the text.

6. Problem 6.8 in the text

7. Problem 6.9 in the text

8. Problem 6.10 in the text

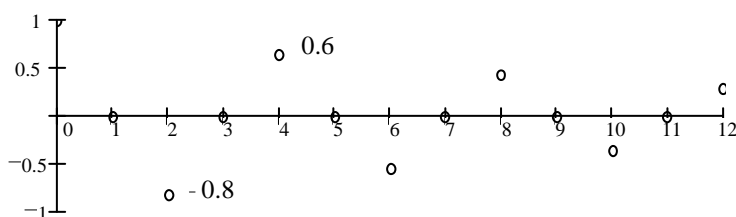
b) hint: find  $y(k)$  by partial fraction expansion, then  $\frac{y(k)}{y(k-1)}$  and then let  $k \rightarrow \infty$ .

**Answers**

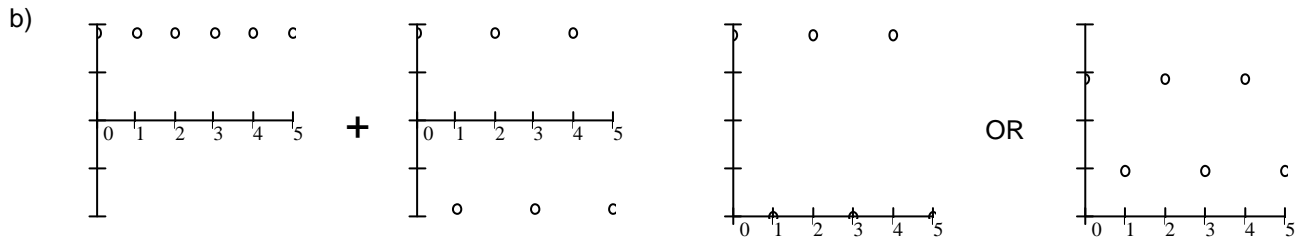
1. a) a    b) 0      2. a)  $\frac{1}{2} \cdot \delta(k) - 1 + \frac{1}{2} \cdot 2^k$     b)  $(\sqrt{2})^k \cdot \sin\left(\frac{\pi}{4} \cdot k\right)$

3. Actual signals may have different magnitudes and/or phase angles. You can't tell those things from the pole locations.

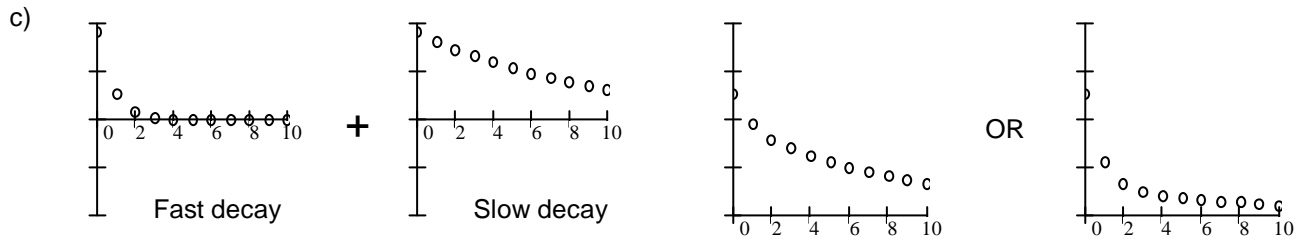
a)  $x(k) = 0.9^k \cdot \cos\left(\frac{\pi}{2} \cdot k\right)$



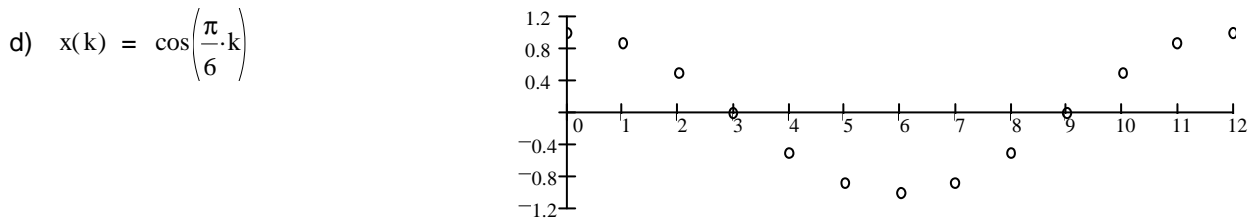
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Or many others, depending on relative magnitudes



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4. (6.6) a)  $x(k) := -4 \cdot \delta(k) + 2 + 2 \cdot \sqrt{2} \cdot \cos\left(\frac{\pi \cdot k + \frac{\pi}{4}}{2}\right)$   
 $x(0) = 0 \quad x(1) = 0 \quad x(2) = 0 \quad x(3) = 4 \quad x(4) = 4 \quad x(5) = 0 \quad x(6) = 0 \quad x(7) = 4 \quad x(8) = 4$

5. (6.7)	<u>Bounded</u>	<u>Converges</u>	<u><math>x(\infty)</math></u>	3. (6.8) a)	yes
a)	yes	yes	0	b)	yes
b)	yes	yes	0	c)	no
c)	yes	no	0	d)	yes
d)	yes	yes	8/9	e)	no
e)	yes	yes	2	f)	yes
f)	no				
g)	yes	no			
h)	yes	yes	1		

6. (6.9) a)  $H(z) = \frac{z^2}{z^2 - a \cdot z + a^2}$  stable if:  $|a| < 1$

b)  $H(z) = \frac{12 \cdot z^2 + 48 \cdot z - 3}{z \cdot (2 \cdot z - 1)}$  stable

7. (6.10) a)  $H(z) = \frac{z^2}{z^2 - z - 1}$  unstable

b)  $\frac{1 + \sqrt{5}}{2} = 1.618$