1 Definitions

1. The *Kronecker delta* function is defined as

$$\delta(n) = \begin{cases} 1 & n = 0 \\ 0 & n \neq 0 \end{cases} \tag{1.1}$$

2. The unit step function is

$$u(n) = \begin{cases} 1 & n \geq 0 \\ 0 & n < 0 \end{cases} \tag{1.2}$$

3. The Z-transform of $x(n)$ is defined as

$$X(z) = \sum_{n=-\infty}^{\infty} x(n) z^{-n}, \quad z \in \mathbb{C} \tag{1.3}$$

4. α, β are the roots of the equation

$$z^2 - z - 1 = 0 \tag{1.4}$$

5.

$$a_n = \frac{\alpha^n - \beta^n}{\alpha - \beta}, \quad n \geq 1 \tag{1.5}$$

6.

$$b_n = a_{n-1} + a_{n+1}, n \geq 2, \quad b_1 = 1 \tag{1.6}$$

2 Problems

Which of the following options is/are correct?

1.

$$\sum_{k=1}^{n} a_k = a_{n+2} - 1, \quad n \geq 1 \tag{2.1}$$

2.

$$\sum_{k=1}^{\infty} \frac{a_k}{10^k} = \frac{10}{89} \tag{2.2}$$

3.

$$b_n = \alpha^n + \beta^n, \quad n \geq 1 \tag{2.3}$$

4.

$$\sum_{k=1}^{\infty} \frac{b_k}{10^k} = \frac{8}{89} \tag{2.4}$$