1. **Probability and Counting Practice**

1. A message source $M$ of a digital communication system outputs a word of length 8 characters, with the characters drawn from the ternary alphabet $\{0, 1, 2\}$, and all such words are equally probable. What is the probability that $M$ produces a word that looks like a byte (i.e., no appearance of ‘2’)?

2. If five numbers are selected at random from the set $\{1, 2, 3, \ldots, 20\}$, what is the probability that their minimum is larger than 5?

2. **Counting**

1. How many ways are there to arrange $n$ ones (“1”) and $k$ zeros (“0”) into a sequence?

2. How many solutions does

$$x_0 + x_1 + \ldots + x_k = n$$

have, if all $x$s must be non-negative integers?

3. How many solutions does

$$x_0 + x_1 = n$$

have, if all $x$s must be strictly positive integers?

4. How many solutions does

$$x_0 + x_1 + \ldots + x_k = n$$

have, if all $x$s must be strictly positive integers?