1) Let \( \{a_n\}_{n=0}^{\infty} \) be the sequence defined by \( a_n = 2n + 1 \). Define a new sequence \( \{b_k\}_{k=0}^{\infty} \) by taking every other term in the first sequence. That is, the new sequence is given by:

\[
a_0, a_2, a_4, a_6, \ldots
\]

Find an explicit formula for \( b_k \).

Relating \( a_n \) and \( b_k \) we see that:

\[
b_0 = a_0 \\
b_1 = a_2 \\
b_2 = a_4 \\
b_3 = a_6
\]

Using that to relate \( n \) and \( k \) we see that \( 2k = n \). Plugging this into the formula we see that:

\[
b_k = a_n = a_{2k} = 2(2k) + 1 = 4k + 1
\]

2) Concatenate the string “abcd” with the string “gogg”.

“abcdgogg”

3) Does your answer to #2 include the string “dog” as a substring?

No. There’s only one d, so the substring starting with d would have to be the substring “dog”. It is “dgo” which is not “dog”.