1. Let $b(n)$ be the number of binary strings of length $n$ that do not contain three 1’s in a row. Give a recurrence for $b(n)$.

2. Call a rooted tree **gorgeous** if every vertex has an even number of children. Draw all gorgeous rooted trees with 7 vertices, assuming vertices are indistinguishable and the order of children doesn’t matter.
3. Consider the graph obtained from a cycle with $2m$ vertices ($m \geq 3$) by joining all pairs of diametrically opposite vertices, so that every vertex has degree 3.

(a) What is this graph called for $m = 3$?

(b) For what $m$ is this graph planar?

(c) What is the chromatic number for $m = 100$?

4. What is the distance of the code with the following generator matrix?

\[
\begin{pmatrix}
1 & 0 & 1 & 0 \\
0 & 1 & 0 & 1 \\
0 & 0 & 1 & 1
\end{pmatrix}
\]