Recall: The i-th binary adder has inputs $x_i, y_i, c_i$
For $i > 1$, instead of waiting for $c_i$ to propagate, we would like to compute it ahead of time.

We have the following formulas:

\[
\begin{align*}
g_i &= x_i y_i \\
p_i &= x_i + y_i \\
c_{i+1} &= g_i + p_i c_i
\end{align*}
\]

Finally, $s_i = c_i \oplus x_i \oplus y_i$

1. Draw the circuits for computing $s_0, s_1, p_0, g_0$.

2. Draw the circuit for computing $c_1$ given inputs wires corresponding to $p_0, g_0, c_0$.

3. Draw the circuit diagram for the 2-bit lookahead adder by combining 1 and 2.
Recall: The i-th binary adder has inputs $x_i, y_i, c_i$
For $i > 1$, instead of waiting for $c_i$ to propagate, we would like to compute it ahead of time.
We have the following formulas:

$$
\begin{align*}
g_i &= x_i y_i \\
p_i &= x_i + y_i \\
c_{i+1} &= g_i + p_i c_i
\end{align*}
$$

Finally, $s_i = c_i \oplus x_i \oplus y_i$

1. Draw the circuits for computing $s_2, p_1, g_1$

2. Draw the circuit for computing $c_2$ given input wires corresponding to $p_0, g_0, p_1, g_1, c_0$.

3. Draw the circuit diagram for the 3-bit lookahead adder by combining 1 and 2 and the 2-bit lookahead adder (you can add on to your diagram from the previous page).

4. How many time steps does it take to compute the final 4-bit sum?