Let $P$ be the polynomial of degree $\leq 3$ that interpolates the data $(1,1), (2,1), (3,2), (0, -1)$. Last time, we found $P$ in Lagrange form. Now find $P$ in Newton form.

\[
\begin{align*}
1 & \quad 1 = c_0 \\
2 & \quad \frac{1-1}{2-1} = 0 = c_1 \\
3 & \quad \frac{2-1}{3-2} = 1 = c_2 \quad \text{or} \quad \frac{1-0}{2-1} = \frac{1}{1} = c_2 \\
0 & \quad \frac{2-(-1)}{3-0} = 1 = c_3 \quad \text{or} \quad \frac{1-(-1)}{0-2} = \frac{2}{0} = c_3
\end{align*}
\]

Therefore,

\[
P(x) = c_0 + c_1(x-x_1) + c_2(x-x_1)(x-x_2) + c_3(x-x_1)(x-x_2)(x-x_3)
\]

\[
= 1 + 0(x-1) + \frac{1}{2} (x-1)(x-2) + \frac{1}{2} (x-1)(x-2)(x-3)
\]

\[
= \ldots \quad \text{(simplify)}
\]