$$W_3^0 = 1, \quad W_3^1 = -\frac{1}{2} + \frac{\sqrt{3}}{2}i, \quad W_3^2 = -\frac{1}{2} - \frac{\sqrt{3}}{2}i$$

24.

$$W_3^0 = \boxed{1}$$

$$W_3^{-1} = \boxed{-\frac{1}{2} - \frac{\sqrt{3}}{2}i}$$

$$W_3^{-2} = \boxed{-\frac{1}{2} + \frac{\sqrt{3}}{2}i}$$

$$
\begin{pmatrix} F(0) \\ F(1) \\ F(2) \end{pmatrix} =
\begin{pmatrix}
1 & 1 & 1 \\
1 & -\frac{1}{2} - \frac{\sqrt{3}}{2}i & -\frac{1}{2} + \frac{\sqrt{3}}{2}i \\
1 & -\frac{1}{2} + \frac{\sqrt{3}}{2}i & -\frac{1}{2} - \frac{\sqrt{3}}{2}i
\end{pmatrix}
\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}
$$

$$
= \begin{pmatrix}
1 + 0 + 1 \\
1 + 0 - \frac{1}{2} + \frac{\sqrt{3}}{2}i \\
1 + 0 - \frac{1}{2} - \frac{\sqrt{3}}{2}i
\end{pmatrix}
= \boxed{\begin{pmatrix}
2 \\
\frac{1}{2} + \frac{\sqrt{3}}{2}i \\
\frac{1}{2} - \frac{\sqrt{3}}{2}i
\end{pmatrix}}
$$