

$$\begin{aligned}
& \sqrt{21-2\sqrt{21+2\sqrt{19-6\sqrt{2}}}} = \sqrt{21-2\sqrt{21+2\sqrt{(\sqrt{18}-\sqrt{1})^2}}} = \\
& = \sqrt{21-2\sqrt{21+2\sqrt{(\sqrt{18}-1)^2}}} = \sqrt{21-2\sqrt{21+2(\sqrt{18}-1)}} = \\
& = \sqrt{21-2\sqrt{21+2(3\sqrt{2}-1)}} = \sqrt{21-2\sqrt{21+(2\cdot 3\sqrt{2}-2)}} = \\
& = \sqrt{21-2\sqrt{21+2\cdot 3\sqrt{2}-2}} = \sqrt{21-2\sqrt{19+2\cdot 3\sqrt{2}}} = \\
& = \sqrt{21-2\sqrt{19+(2\cdot 3)\sqrt{2}}} = \sqrt{21-2\sqrt{19+6\sqrt{2}}} = \sqrt{21-2\sqrt{(\sqrt{18}+\sqrt{1})^2}} = \\
& = \sqrt{21-2\sqrt{(\sqrt{18}+1)^2}} = \sqrt{21-2(\sqrt{18}+1)} = \sqrt{21-2(3\sqrt{2}+1)} = \\
& = \sqrt{21-(2\cdot 3\sqrt{2}+2)} = \sqrt{21-2\cdot 3\sqrt{2}-2} = \sqrt{19-2\cdot 3\sqrt{2}} = \sqrt{19-(2\cdot 3)\sqrt{2}} = \\
& = \sqrt{19-6\sqrt{2}} = \sqrt{(\sqrt{18}-\sqrt{1})^2} = \sqrt{(\sqrt{18}-1)^2} = \sqrt{18}-1 = 3\sqrt{2}-1
\end{aligned}$$

$$\begin{aligned}
& \sqrt{3-2\sqrt{2}}^4 \sqrt{17+12\sqrt{2}} = \sqrt{(\sqrt{2}-\sqrt{1})^2}^4 \sqrt{17+12\sqrt{2}} = \\
& = \sqrt{(\sqrt{2}-1)^2}^4 \sqrt{17+12\sqrt{2}} = (\sqrt{2}-1)^4 \sqrt{17+12\sqrt{2}} = (\sqrt{2}-1)\sqrt{\sqrt{9}+\sqrt{8}} = \\
& = (\sqrt{2}-1)\sqrt{3+\sqrt{8}} = (\sqrt{2}-1)\sqrt{(\sqrt{2}+\sqrt{1})^2} = (\sqrt{2}-1)\sqrt{(\sqrt{2}+1)^2} = \\
& = (\sqrt{2}-1)(\sqrt{2}+1) = \sqrt{2}^2 - 1^2 = \sqrt{2}^2 - 1 = 2 - 1 = 1
\end{aligned}$$