

$$\begin{aligned}\sqrt{\left(\frac{2-p}{2}\right)^2 + 2p} &= p + \frac{2-p}{2} \\ \sqrt{\frac{4-4p+p^2}{4} + 2p} &= \frac{2p+2-p}{2} \\ \sqrt{\frac{4-4p+p^2+8p}{4}} &= \frac{p+2}{2} \\ \frac{\sqrt{p^2+4p+4}}{2} &= \frac{p+2}{2} \\ \sqrt{(p+2)^2} &= p+2 \\ |p+2| &= p+2\end{aligned}$$