$$\begin{aligned}
E(\tilde{\theta}) &= E(\tilde{\tau}_2 + \bar{Y}) \\
&= E(\tilde{\tau}_2) + E(\bar{Y}) \\
&= \tau_2 + \mu \quad \text{since unbiased}
\end{aligned}$$

$$\begin{aligned}
Var(\tilde{\theta}) &= Var(\tilde{\tau}_2 + \bar{Y}) \\
&= Var(\bar{Y_2} - \bar{Y} + \bar{Y}) \\
&= Var(\bar{Y_2}) \\
&= \frac{\sigma^2}{4}
\end{aligned}$$

So,

$$\begin{aligned}
d &= \frac{\hat{\theta} - 30}{se(\tilde{\theta})} \\
&= \frac{25.25 - 30}{2.939/\sqrt{4}} \\
&= -3.232392
\end{aligned}$$

$$\begin{aligned}
E(\tilde{\theta}) &= E(\tilde{\tau}_1) - 2E(\tilde{\tau}_2) + E(\tilde{\tau}_3) \\
&= \tau_1 - 2\tau_2 + \tau_3 \quad \text{since unbiased}
\end{aligned}$$

and,

$$\begin{aligned}
Var(\tilde{\theta}) &= Var(\tilde{\tau}_1 - 2\tilde{\tau}_2 + \tilde{\tau}_3) \\
&= Var(\tilde{\tau}_1) + 4Var(\tilde{\tau}_2) + Var(\tilde{\tau}_3) \\
&= \frac{\sigma^2}{4} + \sigma^2 + \frac{\sigma^2}{4} \\
&= \frac{3}{2}\sigma^2
\end{aligned}$$

So,

$$\begin{aligned}
d &= \frac{\hat{\tau}_1 - 2\hat{\tau}_2 + \hat{\tau}_3 - 0}{\frac{3}{2}\hat{\sigma}^2} \\
&= 2\frac{4.25 - 2 \times 6.5 - (4.25 + 6.5)}{3 \times 2.939} \\
&=
\end{aligned}$$