

Original Expression: $\neg (xy + z)^{\complement}(x + z)$

Apply De Morgan's Law to $(xy + z)^{\complement}$:

$$(xy + z)^{\complement} = (xy)^{\complement} \cdot z^{\complement} \quad (\text{De Morgan's Law})$$

Apply De Morgan's Law to $(xy)^{\complement}$:

$$(xy)^{\complement} = x^{\complement} + y^{\complement} \quad (\text{De Morgan's Law})$$

$$(xy + z)^{\complement} = (x^{\complement} + y^{\complement}) \cdot z^{\complement}$$

Substitute into the original expression:

$$(x^{\complement} + y^{\complement}) \cdot z^{\complement} \cdot (x + z)$$

Distribute $(x^{\complement} + y^{\complement}) \cdot z^{\complement}$ over $(x + z)$:

$$[(x^{\complement} + y^{\complement}) \cdot z^{\complement} \cdot x] + [(x^{\complement} + y^{\complement}) \cdot z^{\complement} \cdot z] \quad (\text{Distributive Law})$$

Simplify the terms:

$$(x^{\complement} \cdot z^{\complement} \cdot x) + (y^{\complement} \cdot z^{\complement} \cdot x) \quad (\text{Distributive Law})$$

$$x^{\complement} \cdot z^{\complement} \cdot x = 0 \quad (\text{Complement Law})$$

$$y^{\complement} \cdot z^{\complement} \cdot x$$

For the second term:

$$(x^{\complement} \cdot z^{\complement} \cdot z) + (y^{\complement} \cdot z^{\complement} \cdot z) \quad (\text{Distributive Law})$$

$$x^{\complement} \cdot z^{\complement} \cdot z = 0 \quad (\text{Complement Law})$$

$$y^{\complement} \cdot z^{\complement} \cdot z = 0 \quad (\text{Complement Law})$$

Combine the results:

$$y^{\complement} \cdot z^{\complement} \cdot x$$