Answer on Question #52895– Math – Algebra

Question

$(a^2 + b^2)(c^2 + d^2)(e^2 + f^2)$ express this as the sum of two squares

Solution

$(a^2 + b^2)(c^2 + d^2) =$

$= a^2c^2 + a^2d^2 + b^2c^2 + b^2d^2 = (a^2c^2 + b^2d^2 + 2acbd) + (a^2d^2 + b^2c^2 - 2acbd) =$

$= (ac + bd)^2 + (ad - bc)^2$

Let $ac + bd = m$ and $ad - bc = n$, then

$((ac + bd)^2 + (ad - bc)^2)(e^2 + f^2) = (m^2 + n^2)(e^2 + f^2) = (me + nf)^2 + (mf - ne)^2 =$

$= \big((ac + bd)e + (ad - bc)f\big)^2 + \big((ac + bd)f - (ad - bc)e\big)^2 =$

$= (ace + bde + adf - bcf)^2 + (acf + bdf - ade + bce)^2$

Answer:

$$\boldsymbol{(a^2 + b^2)(c^2 + d^2)(e^2 + f^2) = (ace + bde + adf - bcf)^2 + (acf + bdf - ade + bce)^2}$$