

Solution

$$\Im[f_1(x, y)] = 2 + 2\cos(v)$$

$$\Im[f_2(x, y)] = 2 + 2\cos(u)$$

$$\begin{aligned}\Im[f_3(x, y)] &= \Im[f_1(x, y)] \cdot \Im[f_2(x, y)] \\ &= (2 + 2\cos(v)) \cdot (2 + 2\cos(u)) \\ &= 4 + 4\cos(u) + 4\cos(v) + 4\cos(u)\cos(v) \\ &= 4 + 4\cos(u) + 4\cos(v) + 2\cos(u+v) + 2\cos(u-v)\end{aligned}$$