

MATH 54 SUMMER 2017, QUIZ 1

Find real numbers a and b such that

$$\frac{4-6i}{6+3i} = a+bi.$$

$$\begin{aligned} \frac{4-6i}{6+3i} &= (4-6i)\left(\frac{1}{6+3i}\right) \\ &= (4-6i)\left(\frac{6+3i}{16+3i1^2}\right) \\ &= (4-6i)\left(\frac{6-3i}{6^2+3^2}\right) \\ &= (4-6i)\left(\frac{6-3i}{45}\right) \\ &= \frac{24-18+(-36-12)i}{45} \\ &= \frac{6-48i}{45} \\ &= \boxed{\frac{6}{45} - \frac{48}{45}i} \end{aligned}$$

Check:

$$\begin{aligned} \left(\frac{6}{45} - \frac{48}{45}i\right)(6+3i) &= \frac{36}{45} - \frac{48 \cdot 6}{45}i + \frac{18}{45}i + \frac{48 \cdot 3}{45} \\ &= \frac{180}{45} - \frac{270}{45}i \\ &= 4 - 6i \end{aligned}$$