Division komplexer Zahlen

Lösung

1) $\frac{4 + 1i}{1 - 10i} =$

$\frac{4 + 1i}{1 - 10i} \bullet \frac{1 + 10i}{1 + 10i} = \frac{4 - 40i + 1i - 10i^2}{1 - 100\,i^2} = \frac{4 - 39i + 10}{1 + 100} = \frac{14 - 39\,i}{101} = \frac{14}{101} - \frac{39i}{101}$

2) $\frac{5 - 8i}{-6 + 10i} =$

$\frac{5 - 8i}{-6 + 10i} \bullet \frac{-6 - 10i}{-6 - 10i} = \frac{-30 + 50i + 48i - 80i^2}{36 - 100\,i^2} = \frac{-30 + 98i + 80}{36 + 100} = \frac{50 + 98\,i}{136} = \frac{50}{136} + \frac{98i}{136}$

3) $\frac{3 + 9i}{8 - 5i} =$

$\frac{3 + 9i}{8 - 5i} \bullet \frac{8 + 5i}{8 + 5i} = \frac{24 - 15i + 72i - 45i^2}{64 - 25\,i^2} = \frac{24 + 57i + 45}{64 + 25} = \frac{69 + 57\,i}{89} = \frac{69}{89} + \frac{57i}{89}$

4) $\frac{-2 + 1i}{-2 - 5i} =$

$\frac{-2 + 1i}{-2 - 5i} \bullet \frac{-2 + 5i}{-2 + 5i} = \frac{4 + 10i - 2i - 5i^2}{4 - 25\,i^2} = \frac{4 + 8i + 5}{4 + 25} = \frac{9 + 8\,i}{29} = \frac{9}{29} + \frac{8i}{29}$

5) $\frac{2 - 9i}{10 + 10i} =$

$\frac{2 - 9i}{10 + 10i} \bullet \frac{10 - 10i}{10 - 10i} = \frac{20 + 20i - 90i - 90i^2}{100 - 100\,i^2} = \frac{20 - 70i + 90}{100 + 100} = \frac{110 - 70\,i}{200} = \frac{110}{200} - \frac{70i}{200}$

6) $\frac{1 + 5i}{-9 + 5i} =$

$\frac{1 + 5i}{-9 + 5i} \bullet \frac{-9 - 5i}{-9 - 5i} = \frac{-9 + 5i - 45i + 25i^2}{81 - 25\,i^2} = \frac{-9 - 40i - 25}{81 + 25} = \frac{-34 - 40\,i}{106} = \frac{-34}{106} - \frac{40i}{106}$

7) $\frac{-5 - 5i}{6 + 9i} =$

$\frac{-5 - 5i}{6 + 9i} \bullet \frac{6 - 9i}{6 - 9i} = \frac{-30 - 45i - 30i - 45i^2}{36 - 81\,i^2} = \frac{-30 - 75i + 45}{36 + 81} = \frac{15 - 75\,i}{117} = \frac{15}{117} - \frac{75i}{117}$

8) $\frac{-3 + 6i}{1 + 1i} =$

$\frac{-3 + 6i}{1 + 1i} \bullet \frac{1 - 1i}{1 - 1i} = \frac{-3 - 3i + 6i + 6i^2}{1 - 1\,i^2} = \frac{-3 + 3i - 6}{1 + 1} = \frac{-9 + 3\,i}{2} = \frac{-9}{2} + \frac{3i}{2}$

9) $\frac{-7 - 1i}{5 - 6i} =$

$\frac{-7 - 1i}{5 - 6i} \bullet \frac{5 + 6i}{5 + 6i} = \frac{-35 + 42i - 5i + 6i^2}{25 - 36\,i^2} = \frac{-35 + 37i - 6}{25 + 36} = \frac{-41 + 37\,i}{61} = \frac{-41}{61} + \frac{37i}{61}$

10) $\frac{-8 - 8i}{5 - 10i} =$

$\frac{-8 - 8i}{5 - 10i} \bullet \frac{5 + 10i}{5 + 10i} = \frac{-40 + 80i - 40i + 80i^2}{25 - 100\,i^2} = \frac{-40 + 40i - 80}{25 + 100} = \frac{-120 + 40\,i}{125} = \frac{-120}{125} + \frac{40i}{125}$

11) $\frac{1 - 9i}{-1 + 1i} =$

$\frac{1 - 9i}{-1 + 1i} \bullet \frac{-1 - 1i}{-1 - 1i} = \frac{-1 + 1i + 9i - 9i^2}{1 - 1\,i^2} = \frac{-1 + 10i + 9}{1 + 1} = \frac{8 + 10\,i}{2} = \frac{8}{2} + \frac{10i}{2}$