

### Aufgabe 5.35

Lösen Sie die Gleichung  $(3-2i)z + 75+3i = \frac{1+9i}{1+i} - 2(1+2i)z$ , geben Sie die Lösung in algebraischer und Polardarstellung an!

**Lösung:**

$$\frac{1+9i}{1+i} = \frac{(1+9i)(1-i)}{(1+i)(1-i)} = \frac{1+9i-i-9i^2}{2} = \frac{10+8i}{2} = 5+4i$$

$$(3-2i)z + 75+3i = 5+4i - 2(1+2i)z, \quad (5+2i)z = -70+i,$$

$$z = \frac{-70+i}{5+2i} = \frac{(-70+i)(5-2i)}{(5+2i)(5-2i)} = \frac{-350+140i+5i-2i^2}{29} = \frac{-348+145i}{29} = \underline{\underline{-12+5i}}$$

$$|-12+5i| = \sqrt{144+25} = \sqrt{169} = 13, \quad \varphi = \arctan\left(-\frac{5}{12}\right) + 180^\circ \approx 157.38^\circ \text{ (da II. Quadrant)}$$

$$z \approx \underline{\underline{13(\cos 157.38^\circ + i \sin 157.38^\circ)}}$$