Homework 4

# Complex numbers

R.A.J. WACANNO (11741163)

Spraakherkenning en -synthese
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1.

$$\begin{aligned} z &= \frac{z_1}{z_2} \\ &= \frac{a+bi}{c+di} \\ &= \frac{i-4}{2i-3} \\ &= \frac{i-4}{2i-3} \cdot \frac{-3-2i}{-3-2i} \\ &= \frac{12+2+(-3+8)i}{-3^2+2^2} \\ &= \frac{14+5i}{13} \end{aligned}$$

2.

$$\begin{aligned} (1+i)^6 &= ((1+i)(1+i)^2)^2 \\ &= (2i(1+i))^2 \\ &= (2(i-1))^2 \\ &= 2^2(i-1)^2 \\ &= 4 \cdot -2i \\ &= -8i \end{aligned}$$

This was not asked by the question, but I'd misread that part.
3. I had some problems doing these exercises, so I'd rather listen to your explanation tomorrow.
4. "
5. "
6. "
7. The `multiply` operation with a factor of 2 can be used. The wave now has an amplitude of 2; i.e. the wave oscillates between 2 and -2.

8. In that case, one could enter `2 * self` in the formula window.

9. `object[1] * object[2]`
`object["Sound sine"] * object["Sound cos"]`

10. The result of this multiplication is another sine wave.

$$\sin\alpha\cos\alpha = \frac{1}{2}\sin 2\alpha$$

So:

$$\sin(2\pi \cdot 377 \cdot t)\cos(2\pi \cdot 377 \cdot t) = \frac{1}{2}\sin(4\pi \cdot 754 \cdot 2t)$$