

## Day 26

# Homomorphisms

1. Let  $\phi : \mathbf{R} \oplus \mathbf{R} \rightarrow \mathbf{R}$  be the function

$$\phi(a, b) = a - b.$$

Show that  $\phi$  is a homomorphism. What is  $\ker \phi$ ? What is  $\phi^{-1}(2)$ ?

2. Let  $\phi : D_n \rightarrow Z_2$  be the function where  $\phi(\text{rotation}) = 0$  and  $\phi(\text{reflection}) = 1$ . Show that  $\phi$  is a homomorphism. What is  $\ker \phi$ ?