A sequence of abelian groups and homomorphisms is *exact* if the image of one map is the kernel of the next. (i.e. a chain with trivial homology).

For each of the following exact sequences of abelian groups and homomorpohisms, say as much as you can about the unknown group G, and/or the unknown homomorphism α.

(1) $0 \to \mathbb{Z}/2 \to G \to \mathbb{Z} \to 0$
(2) $0 \to \mathbb{Z} \to G \to \mathbb{Z}/2 \to 0$
(3) $0 \to \mathbb{Z} \xrightarrow{\alpha} \mathbb{Z} \oplus \mathbb{Z} \to \mathbb{Z} \oplus \mathbb{Z}/2 \to 0$
(4) $0 \to G \xrightarrow{\alpha} \mathbb{Z} \oplus \mathbb{Z} \to \mathbb{Z}/2 \to 0$
(5) $0 \to \mathbb{Z}/3 \to G \to \mathbb{Z}/2 \to \mathbb{Z} \xrightarrow{\alpha} \mathbb{Z} \to 0$