

UW Math Circle Homework

We say that a group is cyclic if it can be generated by a single element. For example, the group of mattress flips of the mattress

is cyclic because it is generated by a 90 degree turn to the right.

Determine if the following groups are cyclic and, if so, what element are they generated by? If the groups are not cyclic, what is the smallest generating set you can find?

1. The integers modulo 6 with addition
2. The integers with addition
3. The permutations of four objects with permutation combination
4. The permutations of two objects with permutation combination
5. The real numbers with addition
6. The nonzero integers modulo 19 with multiplication
7. Symmetries of the letter A
8. Symmetries of a regular pentagon