MAU22C00 - TUTORIAL 6

1) Let $A = \{3^p \mid p \in \mathbb{N}\}$ with the operation of multiplication.
   - (a) Is $(A, \cdot)$ a semigroup? Justify your answer.
   - (b) Is $(A, \cdot)$ a monoid? Justify your answer.
   - (c) Does $(A, \cdot)$ have invertible elements? If so, which of its elements are invertible? Justify your answer.

2) (Slightly modified question from the annual exam 2017-2018) Let $A = \{(x, y) \in \mathbb{R}^2 \mid x + 2y = 0\}$ with the operation of addition given by

$$(x_1, y_1) + (x_2, y_2) = (x_1 + x_2, y_1 + y_2).$$

   - (a) Is $(A, +)$ a semigroup? Justify your answer.
   - (b) Is $(A, +)$ a monoid? Justify your answer.
   - (c) Does $(A, +)$ have invertible elements? If so, which of its elements are invertible? Justify your answer.
   - (d) What geometric object is the set A in $\mathbb{R}^2$?