Math 131 - HW 1

Read Chapter 1 of Axler and 'Guidelines for proofs' handout on website.

1. (a) Express the set $\{x \in \mathbb{Z} \; : \; |x - 2| \leq 2.5\}$ in the form $\{x_1, \ldots, x_n\}$.

    (b) Express the set $\{0, 4, 8, \ldots, 96, 100\}$ using 'set building notation.'

    (c) How many elements are there in the set $\{2n \mid n \in \mathbb{Z}\} \cap \{2n + 1 \mid n \in \mathbb{Z}\}$? Why?

2. Let $x \in \mathbb{F}^n$ and let $a, b \in \mathbb{F}$ be scalars. Prove that

$$(ab)x = a(bx).$$

3. (a) Let a and b be real numbers which are not both 0. Then $a + bi$ is a nonzero complex number. Find real numbers c and d such that:

$$1/(a + bi) = c + di.$$

    Hint: Compute the product $(a + bi)(a - bi)$.

    (b) Using the previous part, show that for every nonzero complex number α, there is a unique complex number β such that $\alpha\beta = 1$.