1. Consider the following formal language:

- The alphabet contains the letters of the English alphabet
- The admissible words are any sequences of symbols that start with the letters 'a' or 'b'. For example “abgiwix” is an admissible word but “saturated” is not.
- Grammatically correct sentences are admissible words, or sequences of admissible words put together with a space symbol ‘ ’. For example, “aa baa bxha aqoiw” is a grammatically correct sentence but “a b c d” is not.

Decide if the following are admissible words, grammatically correct sentences or neither.
(a) “aa bb accc bdddd aeeeee”
(b) “axatyua”
(c) “masdnasbdmnasd”

2. Consider the predicate

\[ P(x) : (x + 1 = 3) \implies (2x + 5 = 10) \]

where \( x \) can only be an integer. Decide if the following propositions are true, or false. You must also give a brief explanation of your answer.
(a) \( \forall x \ P(x) \)
(b) \( \exists x \ P(x) \)
Consider the predicates

\[ P(x) : x \text{ is a vowel in the English alphabet.} \]
\[ Q(x) : x \text{ is a letter that appears in the word “quixotic”.} \]

(a) Write the elements of the sets \( A = \{ x \mid P(x) \} \) and \( B = \{ x \mid Q(x) \} \)

(b) Is it true that \( A \subseteq B \)? Explain your answer.

(c) Write the elements of the set \( A \cap B^c \).