1. 1.1.1
    - (a) True. Vacuously true.
    - (c) True. By definition.
    - (e) True.
    - (g) False. Elements of $2^{\{a,b,\{a,b\}\}}$ are sets.
2. 1.1.2
    - (a) $\{3, 5\}$
    - (c) $\{1, 2, 7, 9\}$
    - (e) $\{\emptyset\}$
3. 1.2.2
    - $R \circ R = \{(a, a), (a, b), (a, c), (a, d), (b, a), (b, b), (b, c)\}$, is not a function, since a is the first component of both (a, a) and (a, b)
    - $R^{-1} = \{(b, a), (c, a), (d, c), (a, a), (a, b)\}$, is not a function, since a is the first component of both (a, a) and (a, b)
    - R is not a function, since a is the first component of both (a, a) and (a, b)
4. 1.3.2.(a)
    - R is
        (a) Not symmetric, $(1, 5) \in R$ but $(5, 1) \notin R$
        (b) Not reflexive, $(5, 5) \notin R$
        (c) Not transitive, $(3, 1) \in R, (1, 5) \in R$ but $(3, 5) \notin R$
    - S is
        (a) Symmetric
        (b) Not reflexive, $(6, 6) \notin S$
        (c) Not transitive, $(3, 1) \in S, (1, 5) \in S$ but $(3, 5) \notin S$