Do the following exercises from the text: Chapter 1 (Section 1.3): 7, 15, 22, 24

Supplemental Exercises

1. In each case, state whether the mapping is onto, one-to-one, or bijective. Justify your answer.

   (a) $f : \mathbb{Z} \times \mathbb{Z}^+ \to \mathbb{Q}$ defined by $\alpha(n, m) = \frac{n}{m}$.

   (b) $f : \mathbb{N} \to \mathbb{N}$ defined by $f(n) = \begin{cases} \frac{n+1}{2}, & \text{if } n \text{ is odd} \\ \frac{n}{2}, & \text{if } n \text{ is even.} \end{cases}$

2. In each case, decide whether the relation $\equiv$ is an equivalence relation on A. Give reasons for your answer. If it is an equivalence relation, describe the equivalence classes.

   (a) $A = \{-1, 0, 1\}$; $a \equiv b$ if $a^2 = b^2$.

   (b) $A = \mathbb{N}$; $a \equiv b$ if $a \leq b$.

   (f) $A =$ the set of all subsets of $\{1, 2, 3\}$; $X \equiv Y$ if $|X| = |Y|$.