

Math 220 – Homework 10

Due Wednesday 04/13 at the beginning of class

PART A

Problems from the textbook:

Section 3.3 # 1(b,c); 2(b), 10(b,c,d,k), 12, 14, 19.

PART B

1. Let $A = \{1, 2, 3, 4\}$, $B = \{a, b, c\}$, and $C = \{w, x, y, z\}$. Consider the functions $f \in F(A, B)$ and $g \in F(B, C)$, where

$$f = \{(1, b), (2, c), (3, c), (4, a)\}, \quad g = \{(a, x), (b, y), (c, x)\}.$$

(i.e. $f(1) = b, f(2) = c$, etc.)

- (a) Find $f^{-1}(\{a, c\})$.
- (b) Determine $g \circ f$.
2. Let $f \in F(A, B)$ and $X \subseteq A$.
- (a) Prove that $X \subseteq f^{-1}(f(X))$.
- (b) Give an example of a function $f \in F(A, B)$ for some A, B and a subset X of A such that $X \neq f^{-1}(f(X))$.
3. Let $a, b \in \mathbb{R} - \{0\}$ and let functions $f, g \in F(\mathbf{R})$ be defined by

$$f(x) = ax + b, \quad g(x) = x + \frac{b}{a}.$$

Compute the *inverse* function of $g \circ f^{-1}$.