Section 8, p83 #30-33, 35, 40-42

In Exercises 30 through 34, determine whether the given function is a permutation of $\mathbb{R}$.

30. $f_1 : \mathbb{R} \to \mathbb{R}$ defined by $f_1(x) = x + 1$

$f_1(x) = x + 1$ **is** a permutation.

31. $f_2 : \mathbb{R} \to \mathbb{R}$ defined by $f_2(x) = x^2$

$f_2(x) = x^2$ **is not** a permutation because it is not one-to-one or onto.

32. $f_3 : \mathbb{R} \to \mathbb{R}$ defined by $f_3(x) = -x^3$

$f_3(x) = -x^3$ **is** a permutation.

33. $f_4 : \mathbb{R} \to \mathbb{R}$ defined by $f_4(x) = e^x$

$f_4(x) = e^x$ **is not** a permutation because it is not onto.

35. Mark each of the following:

True or False

a. Every permutation is a ono-to-one function

True, but it is also onto.

b. Every function is a permutation if and only if it is one-to-one

False, it must also be onto.

c. Every function from a finite set onto itself must be one to one

True

d. Every group G is isormorphic to a subgroup of S_G

True, this is Cayley's Theorem

Theory

In Exercises 40 through 43, let A be a set, B a subset of A, and let b be one particular element of B. Determine whether the given set is sure to be a subgroup of S_A under the induced operation. Here $\sigma[B] = \{\sigma(x) : x \in B\}$.

40. $\{\sigma \in S_A : \sigma(b) = b\}$

Yes

41. $\{\sigma \in S_A : \sigma(b) \in B\}$

No

42. $\{\sigma \in S_A : \sigma[B] \subseteq B\}$

No