

MATH213 HW 2

Due Wednesday, September 6

Solve five of the six problems below.

- Find the domain and range of these functions.
 - the function that assigns to each real number its square;
 - the function that assigns to each positive real number the square root of it;
 - the function that assigns to each bit string the difference between the number of zero bits and the number of one bits in this string;
 - the function that assigns to each pair of positive integers their sum.
- Give an explicit formula for a function from the set of positive integers to the set of non-negative integers that is
 - one-to-one, but not onto;
 - onto, but not one-to-one;
 - neither onto nor one-to-one;
 - both one-to-one and onto.
- Let $f(x) = 2x + 1$, $g(x) = x^2 - 2$, and $h(x) = x - 10$. Find
 - $f \circ g \circ h$,
 - $h \circ g \circ f$,
 - $h \circ g \circ f \circ h$.
- Draw the graphs of these functions.
 - $f_1(x) = \lfloor x + \frac{1}{2} \rfloor - 1$;
 - $f_2(x) = \lfloor x - \frac{1}{3} \rfloor + \lceil x + \frac{1}{3} \rceil$;
 - $f_3(x) = \lfloor 0.5 \lceil 2x/3 \rceil + 0.5 \rfloor$.
- If we have pennies, dimes, quarters and dollars, but no nickels, does the greedy algorithm always produce change using the fewest coins possible? If “yes”, give a proof, if no, present a counterexample.
- Problem 2 on page 129 of the book.