ECS20
Discussion 5: 10/20 to 10/26 2016

Exercise 1

Determine whether each of these functions is a bijection from R to R:

a) $f(x) = -3x+4$
b) $f(x) = x^2+1$
c) $f(x) = (x+1)/(x+2)$
d) $f(x)=(x^2+1)/(x^2+2)$

Exercise 2

Let S = {-1,0,2,4,7}. Find f(S) if:

a) $f(x) = 1$
b) $f(x) = 2x+1$
c) $f(x) = \left\lceil \frac{x}{5} \right\rceil$
d) $f(x) = \left\lfloor \frac{x^2+1}{3} \right\rfloor$

Exercise 3

Let *S* be a subset of a universe *U*. The characteristic function f_S of *S* is the function from U to the set {0,1} such that $f_S(x)=1$ if *x* belongs to *S* and $f_S(x) = 0$ if x does not belong to S. Let *A* and *B* be two sets. Show that for all *x* in *U*,

a) $f_{A\cap B}(x) = f_A(x)\cdot f_B(x)$
b) $f_{A\cup B}(x) = f_A(x) + f_B(x) - f_A(x)\cdot f_B(x)$

Exercise 4

Let n be an integer. Show that $\left\lfloor \frac{n}{2} \right\rfloor \left\lceil \frac{n}{2} \right\rceil = \left\lfloor \frac{n^2}{4} \right\rfloor$