COMP302 A5
Q3 AND Q4
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Q3
let S = fun x -> (fun y -> (fun z -> (x z) (y z)))

We see right away that S has three functions fun x-> fun y -> fun z.
set x: ‘a, y: ‘b, z: ‘c, (x z): ‘d, (y z): ‘e
so x: ‘b -> ‘c -> ‘d *‘e = ‘a

So, take first (x z), you already know that x:’a and z:’c,
which means that (x z) : ‘c -> ‘d = ‘a
(takes z type input returns an output (call it ‘d) and this in equivalent to the type of the fun x as it is an x fun call)
so: ‘a = ‘c -> ‘d
Take (y z), you already know that y: ‘b and z: ‘c
which means that (y z): ‘c -> ‘e = ‘b
(takes z type input returns an output (call it ‘e) and this in equivalent to the type of the fun y as it is an y fun call)
so: ‘b = ‘c -> ‘e
Set ((x z) (y z)) : ‘f, we already know that (x z) = ‘d, (y z)=’e
so: ‘d = e’ -> ‘f
(take (y z) type input returns an output(call it ‘e) and this is equivalent to the type of the fun (x z) as it is an (x z) fun call)

Then,
x: ‘c -> (‘e -> ‘f)
y: ‘c -> ‘e
z: ‘c -> ‘f
then val s:(‘c -> (‘e->’f)) -> (‘c ->’e) -> (‘c->’f)

(*after compiling in F# we get:
val S : ('a -> 'b -> 'c) -> ('a -> 'b) -> 'a -> 'c
therefore, if ‘c = ‘a, ‘e=’b and ‘f=’c then the two matches.
*)

Q4
int is a subtype of float
int -> int is not a subtype of float -> float
because on the right hand side(float -> float side):
you are providing float and expect to reutrn float
but on the left hand side(int -> int side):
you are providing int and expect to return int
but you said on the right hand side that
you are going to delivered float instead of int
so you dont know how to deal with it, the output isnt what was promised.
Thus, this doesnt work.