cs113 Lab Build Script

Text written to file build.sh

```
doctex lab.doc
pptexenv latex lab.tex
dvipdf lab.dvi
```

Bourne Shell

```
chmod 777 build.sh
```

Problem 15.21 Math

- Plug g(x) as x in f(x) and expand
  - f(2x-7)
  - -4(2x-7)+9
  - -8x+37
- Plug f(x) as x in g(x) and expand
  - g(-4x+9)
  - 2(-4x+9)-7
  - -8x+11

Problem 15.21
Let f be the relation on $\mathbb{R}$ defined by $x\ f\ y$ if and only $f(x) = -4x + 9$. Let g be the relation on $\mathbb{R}$ defined by $x\ g\ y$ if and only $g(x) = 2x - 7$. Find $f \circ g$ and $g \circ f$.

Problem 15.21 SML

SML

```
datatype 'a seq = Empty | Cons of 'a * (unit -> 'a seq);
fun seqFrom i = Cons(i,fn() => seqFrom(i+1));
val nat = seqFrom 1;
fun takeSeq(0,_) = []
   |takeSeq(_,Empty) = []
   |takeSeq(i,Cons(n,s)) = n::takeSeq(i-1,s());
val test = takeSeq(10000,nat);
fun id(x) = x;
fun f(x) = (~4*x)+9;
fun g(x) = (2*x)-7;
fun fg(x) = (~8*x) + 37;
fun gf(x) = (~8*x) + 11;
(map (fn x=> f(g(x))) test) = (map (fn x=> fg(x)) test);
(map (fn x=> g(f(x))) test) = (map (fn x=> gf(x)) test);
```

```
> datatype 'a seq = Empty | Cons of 'a * (unit -> 'a seq);
fun seqFrom i = Cons(i,fn() => seqFrom(i+1));
val nat = seqFrom 1;
fun takeSeq(0,_) = []
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val test = takeSeq(10000,nat);
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fun g(x) = (2*x)-7;
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fun gf(x) = (~8*x) + 11;
(map (fn x=> f(g(x))) test) = (map (fn x=> fg(x)) test);
(map (fn x=> g(f(x))) test) = (map (fn x=> gf(x)) test);
datatype 'a seq = Cons of 'a * (unit -> 'a seq) | Empty
> val seqFrom = fn: int -> int seq
> val nat = Cons (1, fn): int seq
> # # val takeSeq = fn: int * 'a seq -> 'a list
> val test = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, ...]: int list
> val id = fn: 'a -> 'a
> val f = fn: int -> int
> val g = fn: int -> int
> val fg = fn: int -> int
> val gf = fn: int -> int
> val it = true: bool
> val it = true: bool
```