PROBLEM M:

Prove: (o ((curry map) f) ((curry map) g)) == ((curry map) (o f g))

PROOF:

GIVEN:

(map f '()) == '() ; map-nil
(map f (cons y ys)) == (cons (f y) (map f ys)) ; map-cons
(((curry f) x) y) == (f x y) ; curry
((uncurry f) x y) == ((f x) y) ; un-curry
((o f g) x) == (f (g x)) ; apply-compose law

Allow y to be an arbitrary input on the left hand side of the proof equation. If we can show that the left hand side acting on input y, is in reality the same thing as the right hand side acting on y.

> Start with left hand side with addition of input y
(o ((curry map) f) ((curry map) g) y)
> apply-compose law
((((curry map f) (((curry map) g) y)
> curry law
(map f ((curry map) g) y)
> curry Law
(map f (map g y)
> apply-compose law
(map (o f g)) y)
> curry law
(((curry map) (o f g))

Therefore we can see that starting with (o ((curry map) f) ((curry map) g) y) and applying just the given 'apply-compose' law and the 'curry' law, we can reach (((curry map) (o f g)) and so we can conclude that (o ((curry map) f) ((curry map) g)) == ((curry map) (o f g))