

# Parametricity and Modular Reasoning

## Homework #3

Instructor: Derek Dreyer

Assigned: Tuesday, 20 November 2012

Due: Tuesday, 27 November 2012

### Unwinding Theorem

Let  $F = \text{fix } f(x).\hat{e}$  and assume  $\vdash F : \sigma \rightarrow \tau$ . Define  $F_0 \stackrel{\text{def}}{=} \text{fix } f(x).f(x)$  and  $F_{n+1} \stackrel{\text{def}}{=} \lambda x.\hat{e}[F_n/f]$ . Prove that if  $f : \sigma \rightarrow \tau \vdash e : \tau'$ , then

1. If  $e[F/f] \downarrow$ , then  $\exists n.e[F_n/f] \downarrow$ .
2. If  $e[F_n/f] \downarrow$ , then  $e[F/f] \downarrow$ .