

Type classes

$(+)$:: Additive $a \Rightarrow$

$a \rightarrow a \rightarrow a$

$(-)$:: AddGroup $a \Rightarrow$

$a \rightarrow a \rightarrow a$

$(*)$:: Multiplicative $a \Rightarrow$

$a \rightarrow a \rightarrow a$

$(/)$:: MulGroup $a \Rightarrow$

$a \rightarrow a \rightarrow a$

Type classes

$(+)$:: Additive $a \Rightarrow$

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$a \rightarrow a \rightarrow a$

$a \rightarrow a \rightarrow a$

$a \rightarrow a \rightarrow a$

$a \rightarrow a \rightarrow a$

Ring

Field

Type classes

Additive

\mathbb{R}

$\mathbb{R} \rightarrow \mathbb{R}$

$\mathbb{R} \rightarrow \mathbb{R} \rightarrow \mathbb{R}$

$\mathbb{R} \rightarrow P \mathbb{R}$

$P \mathbb{R}$

$P(P \mathbb{R})$

$P(\text{Bool} \rightarrow \mathbb{R})$

Type classes

$$\text{mulL } (a:as) \text{ } ys = \text{mulL } ([a] + 0:as) \text{ } ys$$

$$= \text{mulL } [a] \text{ } ys + \text{mulL } (0:as) \text{ } ys$$

$$\text{eval } (a:as) \text{ } x = \underline{a} + \underline{x} \cdot \underline{\text{eval } as \text{ } x}$$

$\mathbb{R} \rightarrow \mathbb{R}$

\mathbb{R}

$$= \text{scaleL } a \text{ } ys \\ + 0: \text{mulL } as \text{ } ys$$

Type classes

Additive

\mathbb{R}

Fun Exp

$\mathbb{P} \mathbb{R}$

$\mathbb{R} \rightarrow \mathbb{R}$

DS Fun Exp

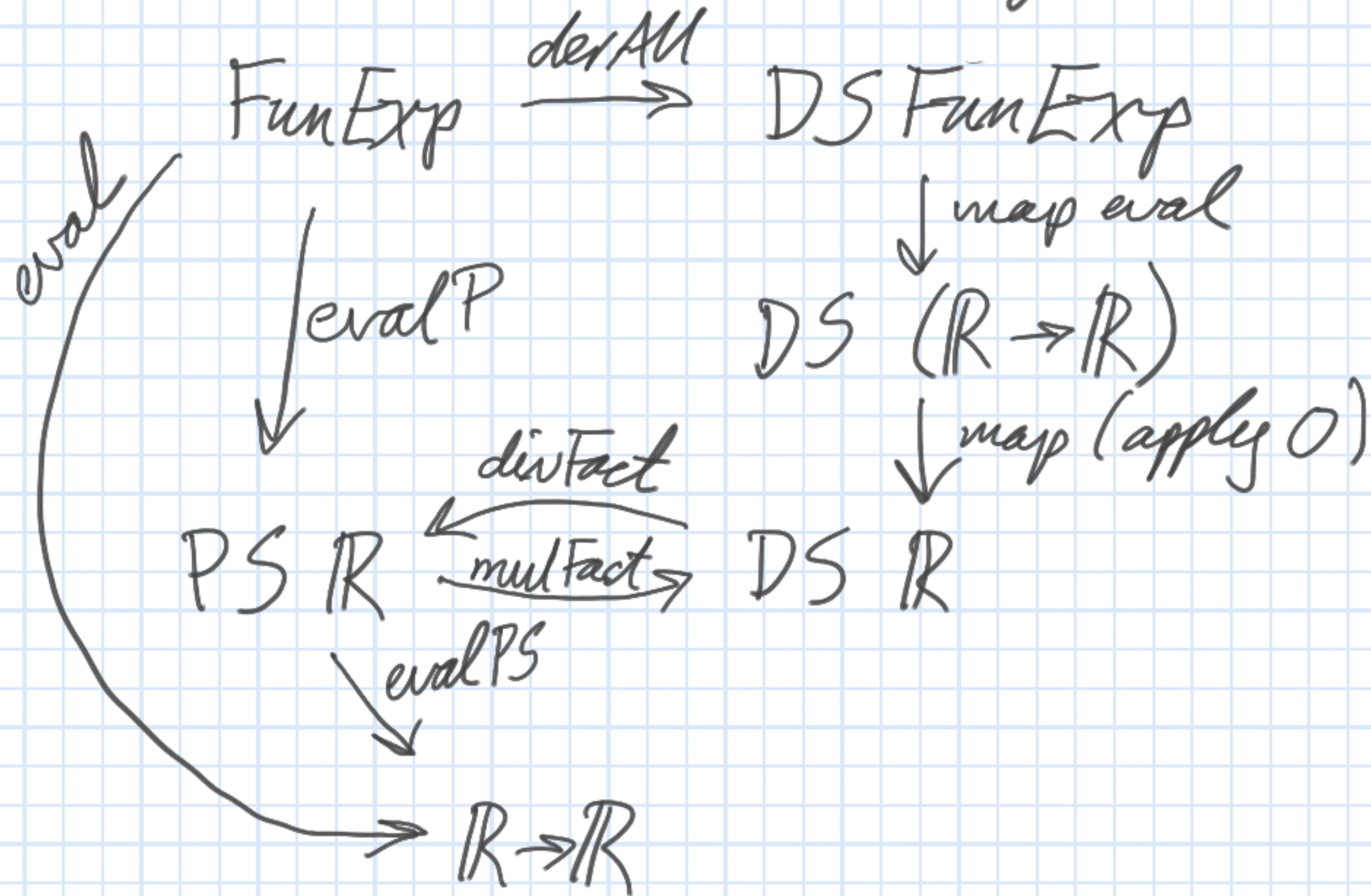
DS \mathbb{R}

$\mathbb{R} \rightarrow \mathbb{R} \rightarrow \mathbb{R}$

DS $(\mathbb{R} \rightarrow \mathbb{R})$

Derivative streams & Taylor series

| Patrik Jansson



DSL $\rightarrow \delta\sigma\lambda$
DSLs of Math

Derivative streams

| Patrik Jansson

$\text{add}, \text{mul} : \text{DS } a \rightarrow \text{DS } a \rightarrow \text{DS } a$

$\text{mul } f_s @ (f : f'_s) \text{ } g_s @ (g : g'_s) = m : m'_s$

where $m = f * g$

$m'_s = \text{add } (\text{mul } f'_s g_s) (\text{mul } f_s g'_s)$

$f : a$
 $f_s, f'_s : \text{DS } a$