Arrows

$$
\begin{array}{rrcl}
(1) & arr\ id \ggg f & = & f \\
(2) & f \ggg arr\ id & = & f \\
(3) & (f \ggg g) \ggg h & = & f \ggg (g \ggg h) \\
(4) & arr\ (g \cdot f) & = & arr\ f \ggg arr\ g \\
(5) & first\ (arr\ f) & = & arr\ (f \times id) \\
(6) & first\ (f \ggg g) & = & first\ f \ggg first\ g \\
(7) & first\ f \ggg arr\ (id \times g) & = & arr\ (id \times g) \ggg first\ f \\
(8) & first\ f \ggg arr\ fst & = & arr\ fst \ggg f \\
(9) & first\ (first\ f) \ggg arr\ assoc & = & arr\ assoc \ggg first\ f
\end{array}
$$

- John Hughes, Generalising Monads to Arrows, *Science of Computer Programming*, 2000.