

Semantic Equivalence

- The semantic definition of a language can also be used to establish the semantic equivalence between syntactic statements.
- For example, are the statements $3+3$ and $2*3$ semantically equivalent?
- We can use our semantic definition written in Prolog to prove this

```
?- val3(plus(const(3),const(3)),[],V1), val3(times(const(2),const(3)),[],V2), V1 = V2.
```

- Or we can use our Natural Semantics and prove it using standard logical inference.

Semantic Equivalence

- Sometimes we want to prove more general expressions than whether $3+3$ and $2*3$ are equivalent.
- Consider,
let $x = E1$ in $E2$ end and $(fn x => E2) E1$.
- It would be difficult to use Prolog here because we don't know what $E1$ and $E2$ look like.
- But we can use the rules of our Natural Semantics to compute equivalence here.