In the standard library.

A set of data values.

```
Inductive bool : Type :=
  | true : bool
  | false : bool.
```

```
Definition negb (b : bool) : bool :=
  match b with
  | true => false
  | false => true
  end.
```

```
Definition andb (b1:bool) (b2:bool) : bool :=
  match b1 with
  | true => b2
  | false => false
  end.
```

```
Example test_negation:
  (negb true) = false.
Proof. simpl. reflexivity. Qed.
```

- Use `Eval` on a test case and observe the result.
- Use `Example`/`Theorem`/whatever to record expected result, then as Coq to verify.
- "extract" function `Definition` to OCaml, Scheme, or Haskell.

```
Eval simpl in (negb true).
```

- `andb`
- `orb`
- `negb`

`admit` fills in holes in `Definitions`.
`Admitted` fills in holes in proofs.

```
bool->bool->bool
```

It causes Coq to print the type of an expression.

If you put declarations between `Module X` and `End X` then after `End` the definitions are referred to as `X.foo`.

```
Inductive nat : Type :=
  | O : nat
  | S : nat -> nat.
```

A set of *expressions*, inductively defined. The definition tells us exactly how members of the type can be constructed, and excludes all other expressions.

Functions come with *computation rules*. Data constructors have no behavior attached.

- `Definition`
- `Fixpoint` in case of recursion

Structural (or *primitive*) recursion. That means recursive calls must be on strictly smaller values, guaranteeing termination.

The following are equivalent:

```
(n m : nat)
(n: nat) (m: nat)
```

A comma is placed between then in the scrutinee and between the two sides of each matching pattern.

With `Notation` constructions which also define associativity and precedence.

- Numerals
- Operators
- Collections syntax

```
expression%notation_scope
```

```
compute
```

Simplifies both sides before testing (including by using `simpl`).

Among other things, `reflexivity` may expand definitions. `simpl` never will.

For a conditional it introduces the antecedent as an assumption. For a universally quantified statement it introduces an arbitrary element of the domain and discharges the quantifier.

The keyword `intros` followed by a space-delimited list of names for the assumptions. These may be names of variables already in context, or they may be ones you're *introducing*. The names are interpreted in the order the relevant expressions appear in the current context.

It rewrites the current goal using the provided rule and in the provided direction.

For example:

```
rewrite -> H
```

Left-to-write means rewriting the terms in the subgoal that match the left-hand-side of the rule being used.

```
Hyp1 -> ... -> HypN -> Conclusion
```

Unknown values may appear as arguments to functions, preventing simplification.

```
destruct var as [pattern].
```

`as [pattern]` is optional.

The pattern consists of names for the data of the possible data constructors of `var` separated by `|`.
For a nullary constructor just put the pipe.

Remember, the `as` pattern in a `destruct/induction` is for the **data** associated with a constructor. Nullary constructors (*values*) have none.
So you would write either of these two:

```
destruct b as [|].
destruct b.
```

... constructor used to create that type.

... our hack `Case` and `SCase`.

Just the same as the `destruct` tactic.

Use the `assert` tactic.

```
assert (H: whatever).
  Case "Proof of assertion". whatever.
```

Coq is choosing the wrong instance of a pattern to rewrite when you use the `rewrite` tactic.
In this case you can prove as a sub-theorem exactly the rewrite you want, and then use `rewrite` in terms of this sub-theorem.