



Homework

1. Define recursively in HOL-Light the function $f : \mathbb{N} \rightarrow \mathbb{N}$ that returns the sum of n first natural numbers.
 - (a) Using `new_recursive_definition` and `num_RECURSION`.
 - (b) Using `new_definition`. Hint: only one equation is allowed, and you need to encode the recursion yourself (inventing something like the Y combinator or maybe something simpler).
2. Prove that $fn = \frac{n(n+1)}{2}$. Use `DIV` for natural division.
 - (a) Using `INDUCT_TAC` and `ARITH...`
 - (b) Only using basic tactics, matching and rewriting
3. Prove in Gentzen-style natural deduction:
 - (a) $(\forall y. Qy \rightarrow Py) \rightarrow Qa \rightarrow Pa$
 - (b) $(\forall x. \forall y. Px \rightarrow Py) \rightarrow Pa \rightarrow \forall x. Px$
4. Give λ_P derivations corresponding to the above proofs.