CS 773 Winter 2002

Exercise Set 5

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Exercise 11

20 pts., due no later than 24-APR-2002, optional

Using Lemma 2 of Exercises 2 and 6, prove in the IMPS theory `h-o-real-arithmetic` that the square root of 2 is irrational.

Exercise 12

20 pts., due no later than 24-APR-2002, optional

In the IMPS theory `h-o-real-arithmetic`,

```
factorial:[zz,rr]
```

is defined as the factorial function using the function

```
prod:[zz,zz,[zz,rr],rr].
```

Define a new factorial function

```
factorial2:[nn,nn]
```

recursively using only the primitive functions of `h-o-real-arithmetic` (in particular, without using `prod`). Then prove the following theorem:

```
forall(x:nn, factorial(n) = factorial2(n)).
```