

INTTIMES, part 5. formulas relating INTTIMES to INTMUL

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```
In[1]:= SetDirectory["1:"]; << goedel88.29a; << tools.m

:Package Title: goedel88.29a      2006 December 29 at 11:11 p.m.

It is now: 2006 Dec 30 at 14:26

Loading Simplification Rules

TOOLS.M                          Revised 2006 December 17

weightlimit = 40
```

summary

The functions **INTTIMES** and **INTMUL** are related to each other by currying and uncurrying. Explicit formulas for this connection are derived in this notebook.

derivation

Lemma.

```
In[2]:= Assoc[IMAGE[SWAP], FUNPART, INTTIMES]

Out[2]= composite[IMAGE[SWAP], INTTIMES] == composite[INVERSE, INTTIMES]

In[3]:= composite[IMAGE[SWAP], INTTIMES] := composite[INVERSE, INTTIMES]
```

Lemma.

```
In[4]:= Map[composite[IMAGE[SWAP], VERTSECT[#]] &,
  SubstTest[reify, x, APPLY[t, x], t → INTTIMES]] // Reverse

Out[4]= composite[VERTSECT[inverse[rotate[INTMUL]]], id[Z]] == composite[INVERSE, INTTIMES]

In[5]:= % /. Equal → SetDelayed
```

Theorem.

```
In[6]:= SubstTest[composite, union[u, v], VERTSECT[inverse[rotate[INTMUL]]],  
  {u → id[set[0]], v → id[complement[set[0]]]}] // Reverse
```

```
Out[6]= VERTSECT[inverse[rotate[INTMUL]]] ==  
  union[cart[complement[Z], set[0]], composite[INVERSE, INTTIMES]]
```

```
In[7]:= VERTSECT[inverse[rotate[INTMUL]]] :=  
  union[cart[complement[Z], set[0]], composite[INVERSE, INTTIMES]]
```

Corollary.

```
In[8]:= SubstTest[composite, inverse[E], VERTSECT[x], x -> inverse[rotate[INTMUL]]] // Reverse
```

```
Out[8]= composite[inverse[E], INVERSE, INTTIMES] == inverse[rotate[INTMUL]]
```

```
In[9]:= composite[inverse[E], INVERSE, INTTIMES] := inverse[rotate[INTMUL]]
```