

Some demos for dednat6: 3.tex

<http://angg.twu.net/dednat6/tests/3.tex>

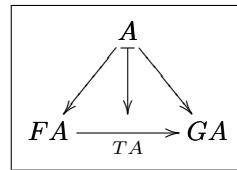
<http://angg.twu.net/dednat6/tests/3.tex.html>

<http://angg.twu.net/dednat6/tests/3.pdf>

See:

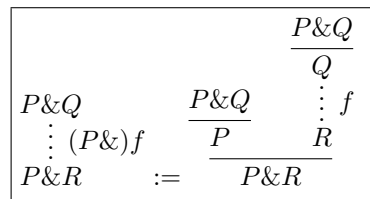
<http://angg.twu.net/dednat6.html>

```
%D diagram T:F->G
%D 2Dx      100   +20  +20
%D 2D 100          A
%D 2D          / - \
%D 2D          / | \
%D 2D          v v v
%D 2D +25 FA -----> GA
%D 2D          TA
%D (( A FA -> A GA ->
%D   FA GA -> .plabel= b TA
%D   A FA GA midpoint |->
%D ))
%D enddiagram
$$$$\pu \diag{T:F->G}$$$$
```



```
$$$$\defdiag{T:F->G}{
  \morphism(300,0)/->/%
  <-300,-375>[A]{FA};{}
  \morphism(300,0)/->/%
  <300,-375>[A]{GA};{}
  \morphism(0,-375)|b|->/%
  <600,0>[FA]{GA};{TA}
  \morphism(300,0)/|->/%
  <0,-375>[A]{\phantom{0}};{}
}
\diag{T:F->G}
$$$$
```

```
%%:
%%:
%%:          P\&Q
%%:          ----
%%:          P\&Q   Q
%%:          ----   :f
%%: P\&Q          P   R
%%:   :(P\&)f    -----
%%: P\&R          P\&R
%%:
%%:   ^t1          ^t2
%%:
$$$$\pu \ded{t1} := \ded{t2}$$$$
```



```
$$$$
\defded{t1}{
  \infer*[{(P\&)f}]{ \mathstrut P\&R }{
    \mathstrut P\&Q } }
\defded{t2}{
  \infer[{}]{ \mathstrut P\&R }{
    \infer[{}]{ \mathstrut P }{
      \mathstrut P\&Q } &
    \infer*[{f}]{ \mathstrut R }{
      \infer[{}]{ \mathstrut Q }{
        \mathstrut P\&Q } } } }
\ded{t1} := \ded{t2}
$$$$
```

Our archetypal adjunctions: $L \dashv R$, $(\wedge Q) \dashv (Q \rightarrow)$, $(\times B) \dashv (B \rightarrow)$.

$$\begin{array}{ccc}
 \begin{array}{ccc}
 LA' \longleftarrow A' & & \\
 \downarrow Lf \quad \longleftarrow \quad \downarrow f & & \\
 LA \longleftarrow A & & \\
 \downarrow g_h^b \quad \rightleftarrows \quad \downarrow g_{h^\sharp} & & \\
 B \longmapsto RB & & \\
 \downarrow k \quad \mapsto \quad \downarrow Rk & & \\
 B' \longmapsto RB' & &
 \end{array} &
 \begin{array}{ccc}
 (\wedge Q)P' \longleftarrow P' & & \\
 \downarrow (\wedge Q)f \quad \longleftarrow \quad \downarrow f & & \\
 (\wedge Q)P \longleftarrow P & & \\
 \downarrow g_h^b \quad \rightleftarrows \quad \downarrow g_{h^\sharp} & & \\
 R \longmapsto (Q \rightarrow)R & & \\
 \downarrow k \quad \mapsto \quad \downarrow (Q \rightarrow)k & & \\
 R' \longmapsto (Q \rightarrow)R' & &
 \end{array} &
 \begin{array}{ccc}
 (\times B)A' \longleftarrow A' & & \\
 \downarrow (\times B)\alpha \quad \longleftarrow \quad \downarrow \alpha & & \\
 (\times B)A \longleftarrow A & & \\
 \downarrow g_h^b \quad \rightleftarrows \quad \downarrow g_{h^\sharp} & & \\
 C \longmapsto (B \rightarrow)C & & \\
 \downarrow \gamma \quad \mapsto \quad \downarrow (B \rightarrow)\gamma & & \\
 C' \longmapsto (B \rightarrow)C' & &
 \end{array}
 \end{array}$$

$$\begin{array}{c}
 \begin{array}{ccc}
 P' \wedge Q \longleftarrow P' & & \\
 \downarrow (\wedge Q)f \quad \longleftarrow \quad \downarrow f & & \\
 P \wedge Q \longleftarrow P & & \\
 \downarrow g_h^b \quad \rightleftarrows \quad \downarrow g_{h^\sharp} & & \\
 R \longmapsto Q \rightarrow R & & \\
 \downarrow k \quad \mapsto \quad \downarrow (Q \rightarrow)k & & \\
 R' \longmapsto Q \rightarrow R' & &
 \end{array} \\
 \left(\begin{array}{c} \frac{P' \wedge Q}{P'} \\ \vdots \\ f \quad \frac{P' \wedge Q}{Q} \\ \frac{P}{P \wedge Q} \end{array} \right) =: (\wedge Q)f \\
 \left(\begin{array}{c} \frac{P \wedge Q}{P} \\ \vdots \\ g \quad \frac{P \wedge Q}{Q \rightarrow R} \\ \frac{Q}{R} \end{array} \right) =: g_h^b \\
 \left(\begin{array}{c} \frac{P \quad [Q]^1}{P \wedge Q} \\ \vdots \\ h \\ \frac{R}{Q \rightarrow R} \quad 1 \end{array} \right) =: g_{h^\sharp} \\
 \left(\begin{array}{c} \frac{[Q]^1 \quad Q \rightarrow R}{R} \\ \vdots \\ k \\ \frac{R'}{Q \rightarrow R'} \end{array} \right) =: (Q \rightarrow)k
 \end{array}$$

$$\begin{array}{ccc}
A' \times B \longleftarrow A' & & \\
\downarrow & \longleftarrow & \downarrow \alpha \\
\lambda p.(\alpha(p), 'p) =: (\times B)\alpha & & \\
A \times B \longleftarrow A & & \\
\downarrow & \longleftarrow & \downarrow g \\
\lambda p.(g(a))('p) =: g^b_h & \rightleftharpoons & g^a_h := \lambda a.\lambda b.h(a,b) \\
C \longmapsto B \rightarrow C & & \\
\downarrow & \longmapsto & \downarrow (B \rightarrow)\gamma := \lambda f.\lambda b.\gamma(f(b)) \\
\gamma & & \\
C' \longmapsto B \rightarrow C' & &
\end{array}$$

Kan extensions: a general case and a particular case.

