Re: make 100 by using 1, 7, 7, 7, 7

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- *From*: Robert Israel <israel@xxxxxxxxxxxxxxxxxxxxxxxxxxxxx>
- *Date*: Tue, 13 Nov 2007 14:05:02 −0600

Kira Yamato <kirakun@xxxxxxxxxxxxx> writes:

> On 2007−11−13 13:22:13 −0500, Robert Israel
> <israel@xxxxxxxxxxxxxxxxxxxxxxxxxxxxx> said:
>
> > "Benjamin A. Bartsch" <benjamin.a.bartsch@xxxxxxxxx> writes:
> >
> > > dangerousgam...@xxxxxxxxx schrieb:
> > >
> > > > So, using only +, −, x, /, and parentheses,
> > > > and ONLY these numbers:
> > > >
> > > > 1, 7, 7, 7, 7
> > > >
> > > > how can you make 100? Is there more than
> > > > one solution?
> > >
> > > −−> (1/7+7)*(7+7)
> > >
> > > Benjamin
> >
> > Yes, and that's the only solution (up to commutativity).
>
> I'm very curious how you concluded this. Was it by a program that
> tests through all possible combinations?
>
> I tried to write a program too, but I stop when I couldn't quickly find
> a way to list out all possible trees with 7 leaves.

Here's my search program, written in Maple.

```
trees:= proc(S)
option remember;
local oper,SL,L,res,ret,V,W,v,w,R,r;
if nops(S) = 1 then {[op(S),op(S)]}
else
res:= {}; ret:= {};
for oper in [`+`,`−`,`/`,`*`] do
for SL in combinat[powerset]({$1..nops(S)}) do
if nops(SL) > 0 and nops(SL) < nops(S) then
L:= sort([seq(S[j],j=SL)]);
R:= sort([seq(S[j],j=({$1..nops(S)} minus SL))]);
V:= trees(L);
W:= trees(R);
for v in V do
for w in W do
if ((oper = `+`) or (oper = `*`)) and (v[1] > w[1]) then next
end if;
try
r:= oper(v[1],w[1]);
catch: next;
end try;
res:= res union {r};
ret:= ret union {[r, [v[2],oper,w[2]]]};
end do
end do
end if
end do
end do;
ret
end if
end proc;


        select(t −> (t[1]=100), T);


{[100, [[[1, /, 7], +, 7], *, [7, +, 7]]]}
```

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