MAT 240 LECTURE #3

SEPT 13/14

REDDLE ALONG: CAN YOU DRAW 4 LINKED LOOPS SO THAT IF YOU DROP ANY ONE OF THEM THE REMAINING 3 WILL FALL APART?

LAST TIME:

1. $a+b=c+b \Rightarrow a=c$ 2. $b\neq 0, a\times b=c\times b \Rightarrow a=c$

3.-6. "$0, 1, -a, a^{-1}$ are unique"

7. $-(-a)=a$, if $a\neq 0$ $(a^{-1})^{-1}=a$

"$:=$" means left side defined by right side

Def^n: Subtraction: If $a,b\in F$ then $a-b:=a+(-b)$ (now that it's made $a-b=a+(-b)$).

Division: If $a,b\in F$, $b\neq 0$ $a\div b=\frac{a}{b}:=a\times(b^{-1})$

P8: $\forall a\in$ $a\times 0=0$

Proof.

$$a+a\times 0 \overset{F3}{=} a\times 0 \overset{F3}{=} a[0+0] \overset{F5}{=} a\times a + a\times 0$$

by Theorem P_1 (cancellation law) $0=a\times 0$ $\square$

P9. "$\nexists 0^{-1}$", ie, $\nexists b$ s.t. $0\times b=1$ or $\forall b$ $0\times b\neq 1$ } same thing.

Proof.

$0\times b=0\neq 1$ (by def^n of a field) $\square$

P10. $(-a)\times b = a\times(-b) = (-a\times b)$

P.11 $(-a)\times(-b) = a\times b$.