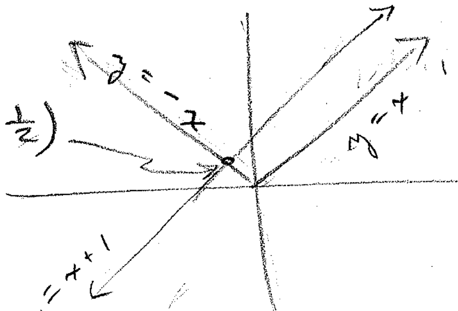
Sec 7.2 problem #29 revisited

$|x| > x+1$ This is the problem I solved by graphing first.



$$y = |x| = \begin{cases} -x, & x < 0 \\ x, & x \geq 0 \end{cases}$$

The fcns $y = |x|$ and $y = x+1$ intersect at $x = -\frac{1}{2}$, $y = \frac{1}{2}$.

Ch. 11 is concerned with finding pts of intersection as seen here, so it's a good problem to bridge the topics.

Notice that the pt. of intersection here is found by setting $y = -x$ equal to $y = x+1$:

$$-x = x+1 \longrightarrow -2x = 1 \longrightarrow \boxed{x = -1/2}$$

$$y = -x = -(-1/2) = 1/2 \longrightarrow \boxed{y = 1/2}$$

or $y = x+1 = -1/2 + 1 = 1/2$

Clearly $|x| > x+1$ on $(-\infty, -1/2)$.

Then I went to solve algebraically using the set-up for $|x| > c$, namely $|x| > c \longrightarrow$ $x > c$ or $x < -c$

Our problem yields:

① $x > x+1$ or ② $x < -(x+1)$

At this pt, Hadas noted correctly for the left "Don't we just cancel the x's?" And I said "Only if this were an equation." But that wasn't true! We'd solve an inequality the same way, and we'd get the same inconsistency.

$$\cancel{x} > \cancel{x} + 1 \rightarrow 0 > 1,$$ which is <u>never</u> true,

as Hadas said. So we <u>discard</u> part ① and consider our options for ②:

$$x < -(x+1)$$
$$x < -x - 1$$
$$2x < -1$$
$$x < -1/2$$ — and here is where
$$|x| < x + 1$$

The graph bears this out. There's no soln. above $x = -1/2$.

So, yes Hadas, the first condition yields $0 > 1$, or no solution. The second yields $x < -1/2$ (just ask Josh!)