

# Math 108-01 Abs Value HW Key

$$|x+1| = |2x+7| - 3$$

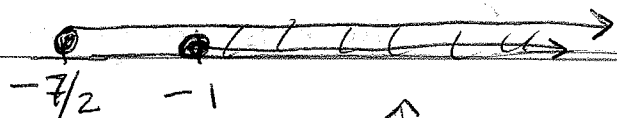
①

$$x+1 = 2x+7 - 3$$

$$-3 = x$$

Discard,  
as it is not  
in the domain

if  
when  $x+1 \geq 0$  and  $2x+7 \geq 0$   
i.e.,  $x \geq -1$  and  $x \geq -7/2$



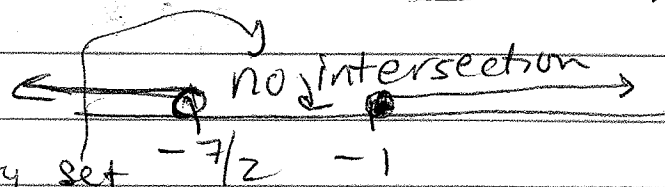
②

$$x+1 = -(2x+7) - 3$$

This solution  
is impossible

because the  
domain is the empty set

if  $x+1 \geq 0$  and  $2x+7 < 0$   
i.e.,  $x \geq -1$  and  $x < -7/2$

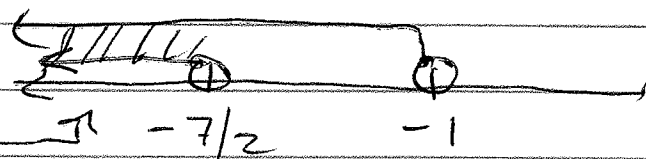


③  $-(x+1) = -(2x+7) - 3$

if  $x+1 < 0$  and  $2x+7 < 0$   
i.e.,  $x < -1$  and  $x < -7/2$

$$-x-1 = -2x-7-3$$

$$\star \boxed{x = -9}$$



Keep this! It is in the domain. Check  
it, too:  $|-9+1| = |2(-9)+7| - 3?$

$$|-8| = |-11| - 3$$

$$8 = 11 - 3 \quad \checkmark$$

$$8 = 8$$

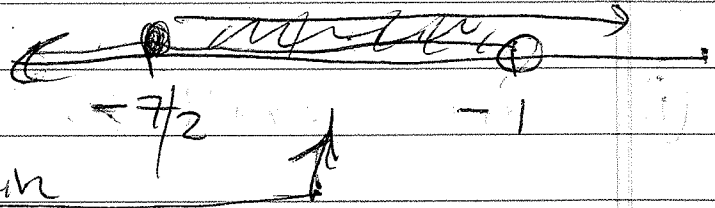
④  $-(x+1) = 2x+7-3$  if  $x+1 < 0$  and  $2x+7 \geq 0$   
 i.e.  $x < -1$  and  $x \geq -7/2$

$-x-1 = 2x+4$

$x = 5$

discard; it is not

here, in domain



∴ There is only one solution:  $x = -9$

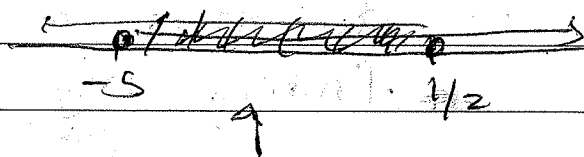
Note: I check each solution, in case one which I conclude should be discarded works — meaning I made some mistake in finding my domain set.

# Math 108-04 Abs value HW key

$$|1-2x| = 3 + |x+5|$$

①  $1-2x = 3 + x+5$  if  $1-2x \geq 0$  and  $x+5 \geq 0$   
 $-3x = 7$  i.e.  $x \leq \frac{1}{2}$  and  $x \geq -5$   
 $x = -7/3$

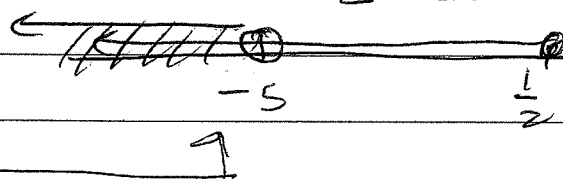
~~discard~~  $x = -2/3$



This is ~~in~~ in the domain, so it's a soln. (Check it.)

②  $1-2x = 3 + -(x+5)$  if  $1-2x \geq 0$  and  $x+5 < 0$   
 $1-2x = 3 - x - 5$  i.e.  $x \leq \frac{1}{2}$  and  $x < -5$   
 $-x = -3$

discard  $x = 3$



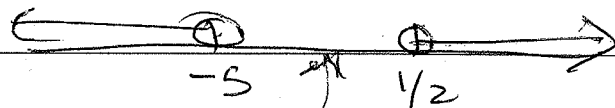
This is not in the domain.

③  $-(1-2x) = 3 + -(x+5)$  if  $x > \frac{1}{2}$  and  $x < -5$   
 $-1 + 2x = 3 - x - 5$  (from above, reverse  $\leq$ )

$$-1 + 2x = -x - 2$$

$$3x = -1$$

$$x = -1/3$$



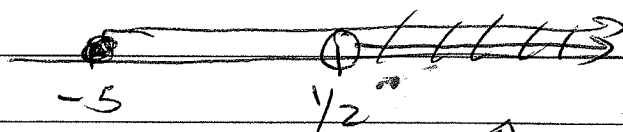
no  $\cap$ , so no solution is possible.

The soln. is impossible because the domain is empty set.

④  $-(1-2x) = 3 + (x+5)$  if  $x > \frac{1}{2}$  and  $x \geq -5$

$$-1 + 2x = 8 + x$$

Keep  $x = 9$



It's in the domain.

$x = -7/3$  and  $x = 9$  are  
the only solutions.

Note - I check my "solution" even if I  
conclude it should be discarded or if  
I have ~~an~~ an empty domain.  
I do this in case I made a mistake  
in finding my domain set.