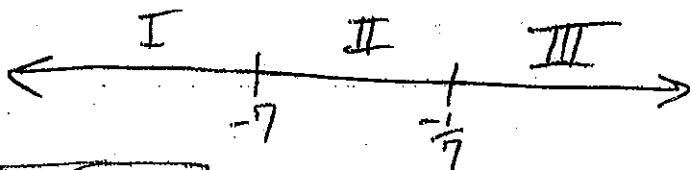


# Advanced Precalculus HW Key: 1/24/12

④  $|x+7| + |7x+1| = x+15$

Key #s:  $-7, -\frac{1}{7}$   
 $x = -7, -\frac{1}{7}$



Case I:  
 $x \leq -7$

$$|-(x+7) - (7x+1)| = x+15$$

$$|-x-7-7x-1| = x+15$$

$$|-8x-8| = x+15$$

$$|8x+8| = x+15$$

$$-(8x+8) = x+15$$

$$-8x-8 = x+15$$

$$-23 = 9x$$

$$x = -\frac{23}{9}$$

No!

↓  
 key #:  
 $x = -1$   
 (not in case)

Case II:  
 $-7 \leq x < -\frac{1}{7}$

$$|x+7 - (7x+1)| = x+15$$

$$|x+7-7x-1| = x+15$$

$$|-6x+6| = x+15$$

$$-6x+6 = x+15$$

$$-9 = 7x$$

$$x = -\frac{9}{7}$$

key #:  
 $x = 1$   
 (not in case)

yes!

yes!

Case III:  
 $x \geq -\frac{1}{7}$

$$|x+7+7x+1| = x+15$$

$$|8x+8| = x+15$$

$$8x+8 = x+15$$

$$7x = 7$$

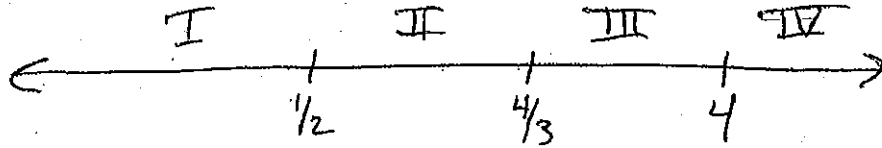
$$x = 1$$

key #:  
 $x = -1$   
 (not in case)

yes!

Overall:  $x = 1$  or  $x = -\frac{9}{7}$

⑤  $|2x-1| + |3x-4| + 5 + |2x-8| = 25 - 3x$  Key #:  $x = \frac{1}{2}, \frac{4}{3}, 4$



Case I:  $x \leq \frac{1}{2}$ :  $|-(2x-1) - (3x-4) + 5| - (2x-8) = 25 - 3x$

$| -2x+1 -3x+4+5 | -2x+8 = 25-3x$

Inside // Positive in this case

(key #:  $x=2$  not in case)

$\rightarrow | -5x+10 | -2x+8 = 25-3x$

$-5x+10 -2x+8 = 25-3x$

$-7x+18 = 25-3x$

$-7 = 4x$

$x = -\frac{7}{4}$  yes!

Case II:  $\frac{1}{2} \leq x \leq \frac{4}{3}$ :  $| (2x-1) - (3x-4) + 5 | - (2x-8) = 25 - 3x$

$| 2x-1-3x+4+5 | -2x+8 = 25-3x$

Inside // Positive in this case

(key #:  $x=8$  not in case)

$\rightarrow | -x+8 | -2x+8 = 25-3x$

$-x+8 -2x+8 = 25-3x$

$-3x+16 = 25-3x$

$16 = 25$

No Solution! (In this case)

Case III:  $\frac{4}{3} \leq x \leq 4$ :  $| (2x-1) + (3x-4) + 5 | - (2x+8) = 25 - 3x$

$| 5x | -2x+8 = 25-3x$

Inside // Positive in this case

(key #:  $x=0$  not in case)

$5x -2x+8 = 25-3x$

$3x+8 = 25-3x$

$6x = 17$

$x = \frac{17}{6}$  yes!

Case IV:  $x \geq 4$ :  $| (2x-1) + (3x-4) + 5 | + (2x-8) = 25 - 3x$

$| 5x-5+5 | + 2x-8 = 25-3x$

key #:  $x=0$  not in this case

(Always positive in this case)

$\leftarrow | 5x | + 2x-8 = 25-3x$

$5x+2x-8 = 25-3x$

$7x-8 = 25-3x$

$10x = 33$

No!  $x = \frac{33}{10}$  Not in case!

Overall:  $x = -\frac{7}{4}$  or  $x = \frac{17}{6}$