Math 108 Fall 2014 Quiz #7 Name Key

Directions: Answer each question as completely as possible. Show all work for credit. Good luck!

1. Solve each inequality. Express your answers using interval notation.

a) $|1-2x| \le 3$

$-3 \le 1-2x \le 3$

etc.

$[-1, 2]$ See pp that follows

b) $\frac{5}{x-3} \ge \frac{3}{x+1}$

$[-7, 1) \cup (3, \infty)$ See pp that follow

$\frac{5}{x-3} - \frac{3}{x+1} \ge 0$

etc.

c) $x(x-7) > 8$

$(-\infty, -1) \cup (8, \infty)$ See pp following

Bring all over to left

d) $\frac{x}{2} - \frac{8x}{3} + \frac{x}{4} > \frac{23}{6}$

$x < -2$ or $(-\infty, -2)$

LCD = 12

e) $|3x-4| > |x+6|$

$(-\infty, -\frac{1}{2}) \cup (5, \infty)$

(Square both sides)

2. Solve for x.

a) $|x^2 + 3x - 2| = 2$

$x^2+3x-2=2$ or $x^2+3x-2=-2$

$x^2+3x-4=0$ $\quad$ $x^2+3x=0$

$(x-1)(x+4)=0$ $\quad$ $x(x+3)=0$

$\boxed{x=1,-4}$ $\quad$ $\boxed{x=0,-3}$ All solns check.

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

$\boxed{x=-7/3,\ 9}$ ← see below

Consider as follows:

(1) $1-2x = 3+x+5$ for $1-2x>0$, $x+5\geq 0$

i.e. $x<\frac{1}{2}$, $x\geq -5$

$-3x = 7$

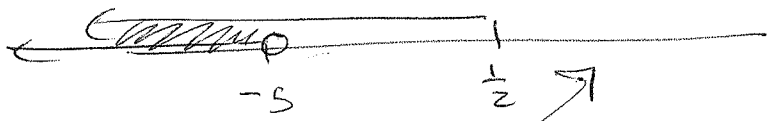
$\boxed{x=\frac{-7}{3}}$ checks

(2) $1-2x = 3+-(x+5)$ for $1-2x>0$, $x+5<0$

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

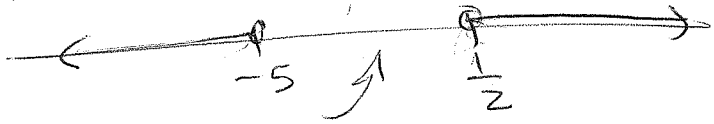
$-x=-3$

$x=3$ not in here, so discard



(3) $-(1-2x) = 3+-(x+5)$ for $1-2x<0$, $x+5<0$

no need to solve

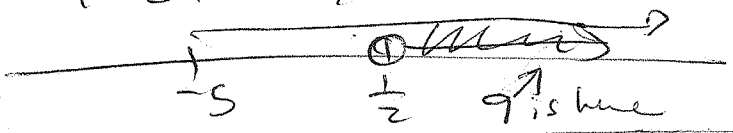


no soln set!

(4) $-(1-2x) = 3+(x+5)$ for $1-2x<0$, $x+5>0$

$-9=-x$

$\boxed{x=9}$



Quiz 7 - Key Fall '14 Math 108

1a) $|1-2x| \le 3$ $\quad -3 \le 1-2x \le 3$

$\boxed{-1 \le x \le 2}$ or $\boxed{[-1,2]}$

b) $\frac{5}{x-3} \gtrless \frac{3}{x+1} \longrightarrow \frac{5}{x-3} - \frac{3}{x+1} \gtrless 0 \longrightarrow \frac{5(x+1)-3(x-3)}{(x-3)(x+1)} \gtrless 0$

$\longrightarrow \frac{2x+14}{(x-3)(x+1)} \gtrless 0$ $\quad x = -7, 3, -1$

First $x=-7$ is part of the soln. $x=-1,3$ are not, so omit on table

	$(-\infty,-7)$		$[-7,-1)$		$(-1,3)$		$(3,\infty)$	
$2(x+7)$	$-$	test -8	$+$	test -2	$+$	test 0	$+$	test 4
$(x-3)(x+1)$	$+$		$+$		$-$		$+$	
Ratio $\gtrless 0$	$-$ discard		$+$ good		$-$ discard		$+$ good	

Soln. $[-7,-1) \cup (3,\infty)$

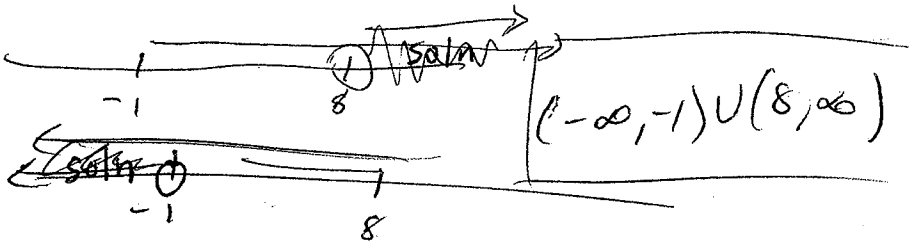
c) $x(x-7) > 8$

$x^2 - 7x - 8 > 0$

$(x-8)(x+1) > 0$

You can draw the graph for your analysis

So either $x > 8$ and $x > -1$ or $x < 8$ and $x < -1$



$(-\infty,-1) \cup (8,\infty)$

#1d) LCD = 12 $12\left(\frac{x}{2} - \frac{8x}{3} + \frac{x}{4}\right) > \left(\frac{23}{6}\right)12$

$6x - 32x + 3x > 46$

~~$-23x > 46$~~ $x < -2$ or $(-\infty, -2)$

e) $|3x-4|^2 > |x+6|^2$ faster than doing cases

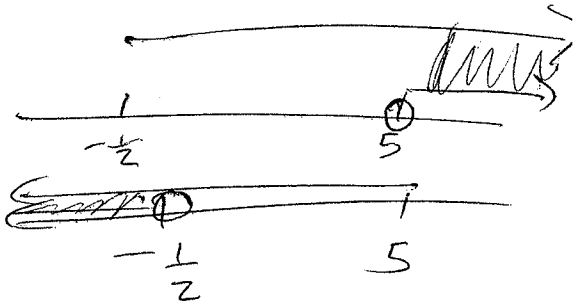
$9x^2 - 24x + 16 > x^2 + 12x + 36$

$8x^2 - 36x - 20 > 0$

$2x^2 - 9x - 5 > 0$

$(2x+1)(x-5) > 0$

~~$x = -\frac{1}{2}, 5$~~



So either $x > -\frac{1}{2}$ and $x > 5$

or $x < -\frac{1}{2}$ and $x < 5$

$(-\infty, -\frac{1}{2}) \cup (5, \infty)$