Math 172–Assignment # 2 **Name:**_____

1. Solve the following equations and state whether the equation is conditional, inconsistent, or an identity.

a) $\frac{x+7}{6} - \frac{8-2x}{2} = -4$

$\{-17\}$

Conditional

LCD=6

$\frac{6(x+7)}{6} - \frac{3}{6}\frac{(8-2x)}{2} = -4(6)$

$x+7 \quad -24+6x = -24$

$7x+7 = 0$

$7x = -7$

$x = -1$

b) $-6k+2k-11 = -2(2k-3)+4$

$\emptyset$

inconsistent

$-4k-11 = -4k+6+4$

$-11 = 10$

c) $0.06y+0.09(15-y) = 0.07(15)$

$\{10\}$

Conditional

$100(0.06y) + 100(0.09)(15-y) = 100(0.07)(15)$

$6y + 9(15-y) = 7(15)$

$6y + 135 - 9y = 105$

$-3y = -30$

$y = \frac{-30}{-3}$

$y = 10$

d) $\frac{3m+1}{5} - \frac{2m+1}{3} = -\frac{m+2}{15}$

$(-\infty, \infty)$ or $\mathbb{R}$ identity

LCD=15

$15\left(\frac{3m+1}{5}\right) - 15\left(\frac{2m+1}{3}\right) = -\frac{15(m+2)}{15}$

$9m+3 - 5(2m+1) = -m-2$

$9m+3-10m-5 = -m-2$

$-m-2 = -m-2$

$0 = 0$

2. Write y in terms of x if $\frac{4x}{3} - \frac{y}{4} = \frac{5}{6}$

$y = \frac{16}{3}x - \frac{10}{3}$

LCD=12

$12\left(\frac{4x}{3}\right) - 12\left(\frac{y}{4}\right) = \frac{5}{6}(12)$

$16x - 3y = 10$

$16x - 10 = 3y$

$\frac{16x-10}{3} = y$

$y = \frac{16x}{3} - \frac{10}{3}$

$y = \frac{16}{3}x - \frac{10}{3}$

3. Solve each equation for a:

a) $7x + a = 2ax$

$a = \frac{-7x}{1-2x}$ or $a = \frac{7x}{2x-1}$

$a - 2ax = -7x$

$a(1-2x) = -7x$

$a = -\frac{7x}{1-2x}$

or $a = \frac{7x}{2x-1}$

b) $\frac{2}{x} - \frac{1}{a} = 1$

$a = \frac{x}{2-x}$ or $a = \frac{-x}{x-2}$

LCD= ax

$\frac{2ax}{x} - \frac{ax}{a} = ax$

$2a - x = ax$

$2a - ax = x$

$a(2-x) = x$

$a = \frac{x}{2-x}$

or $a = \frac{-x}{x-2}$

4. Solve the following inequalities, state the solution in interval notation, and graph it.

a) $-3 < \frac{4-3x}{5} \leq 2$

$-15 < 4-3x \leq 10$

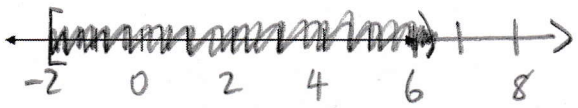
$-19 < -3x \leq 6$

$\frac{-19}{-3} > \frac{-3x}{-3} \geq \frac{6}{-3}$

$\frac{19}{3} > x \geq -2$

or $-2 \leq x < \frac{19}{3}$

$[-2, \frac{19}{3})$



b) $2 - y > y - 2$

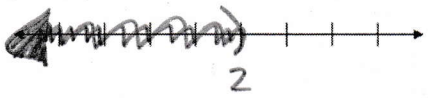
$2 > 2y - 2$

$4 > 2y$

$2 > y$

or $y < 2$

$(-\infty, 2)$



c) $\frac{3}{4}z - \frac{1}{8} < \frac{1}{2}z - \frac{5}{4}$ or $-z < 0$

LCD=8

$8(\frac{3}{4}z) - 1 < 4z - 8(\frac{5}{4})$

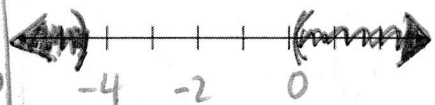
$6z - 1 < 4z - 10$

$2z < -9$

$z < -\frac{9}{2}$

$z > 0$

$(-\infty, -\frac{9}{2}) \cup (0, \infty)$



$z < -\frac{9}{2}$ or $z > 0$

5. Solve the following absolute value equations.

a) $|2x - 1| - 3 = 0$

$\{2, -1\}$

$|2x-1| = 3$

$2x-1=3$ $\quad$ $2x-1=-3$

$2x=4$ $\quad$ $2x=-2$

$x=2$ $\quad$ $x=-1$

b) $|\frac{x}{2} - 5| = -1$

$\emptyset$

No solution:
absolute value cannot be negative.

6. Find four consecutive integers such that the sum of the first three is 60 more than the fourth.

Let x = 1st number

(1) $x+1$ = 2nd "

$x+2$ = 3rd "

$x+3$ = 4th "

(1) $x+(x+1)+(x+2) = 60+(x+3)$

$3x+3 = x+63$

$2x = 60$

$x = 30$

(1) The numbers are 30, 31, 32 and 33.

7. Jeff can bike to work in $\frac{3}{4}$ of an hour. When he takes the bus, the trip takes 15 minutes. If the bus takes the same route and travels 20 miles per hour faster than Jeff rides his bike, what is the speed of the bus?

(1) Let x = speed of bus (miles per hour)

$x-20$ = speed of bike

	Bus	Bike
Speed (mph)	x	$x-20$
Time (hr)	$\frac{1}{4}$	$\frac{3}{4}$
Distance (miles)	$\frac{1}{4}x$	$\frac{3}{4}(x-20)$

(1) LCD = 4

$\frac{1}{4}x = \frac{3}{4}(x-20)$

$x = 3(x-20)$

$x = 3x-60$

$60 = 2x$

$30 = x$ (1)

The bus speed is 30 mph. (1)

8. Blair needs a 25% acid solution for an experiment in class but he only has pure acid and a 15% solution to work with. How much pure acid must he add to 80 litres of a 15% acid solution to produce a 25% acid solution?

Let x = volume of pure acid (L) (1)

	V_{sol} (L)	%	$V_{acid} = V_{sol}(\%)$
15%	80	0.15	$80(0.15)$
pure acid (100%)	x	1	x
25%	$80+x$	0.25	$0.25(80+x)$

$80(0.15) + x = 0.25(80+x)$ (1)

$12 + x = 20 + 0.25x$

$0.75x = 8$

$\frac{3}{4}x = 8$

$x = 8\left(\frac{4}{3}\right)$

$x = \frac{32}{3}$ (1)

(1) Blair needs $\frac{32}{3}$ L of pure acid.

9. At the local Starbucks you can buy El Cheapo coffee for \$4 per pound or Pricey coffee for \$8 per pound. If the two types of coffee are mixed to make 50 pounds of Super Holiday Deluxe Blend at \$5.60 per pound, how many pounds of each type are used in the blend?

Let x = # pounds of El Cheapo (1)

$50-x$ = " " Pricey

	lbs	\$/lb	\$
El Cheapo	x	4	$4x$
Pricey	$50-x$	8	$8(50-x)$
Blend	50	5.6	$50(5.6)$

$4x+8(50-x)=50(5.6)$ (1)

$4x+400-8x=280$

$120=4x$

$30=x$ (1)

30 pounds of El Cheapo and 20 pounds of Pricey are used. (1)