Group Quiz 1
Calc I
Fall 2010

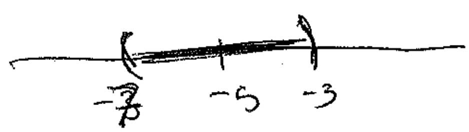
YOUR NAME: ____________________
GROUP MEMBER: ____________________
GROUP MEMBER: ____________________

Problem 1: Solve the following inequalities. Graph you answer on the number line. Use the geometric argument when possible.
(a) $|x+5| < 2$
(b) $|2x+5| > 2$
(c) $|x+2| \geq x-7$

Problem 2: Answer the following questions about lines:
(a) A line of slope $m = 2$ passes through $(1,4)$. Find y such that $(3,y)$ lies on the line.
(b) Find b such that $(2,-1)$, $(3,2)$ and $(b,5)$ lie on a line.
(c) Find a c such that $cx + y = 1$ is vertical.

Problem 3: Answer the following questions about quadratics:
(a) Prove that $x + \frac{1}{x} \geq 2$ for all $x > 0$.
(b) Find numbers x and y with sum 10 and product 24, or show that it's impossible. To do this you could solve a quadratic equation.
(c) Find numbers x and y with sum -1 and product 1, or show that it's impossible. To do this you'll probably **have** to solve a quadratic.

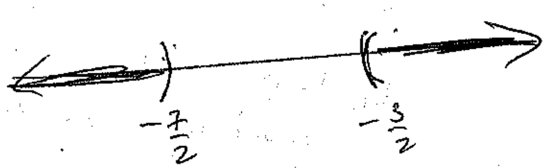
1(a) all x that are no more than 2 units away from -5



1(b) $|2x+5| > 2 \iff 2\left|x+\frac{5}{2}\right| > 2$

$\iff \left|x+\frac{5}{2}\right| > 1$

all x that are at least one unit away from $-\frac{5}{2}$



1(c): If $x<7$, the left hand side is negative, so in that case the inequality is true, since $|x+2| \geq 0$. If $x \geq 7$, then $x+2>0$ so

$x+2 \geq x-7$, $0 \geq -9$. Always true. So it works for all x.

2a $y = 2x + b$ $y = 2 \cdot 3 + 2$

$4 = 2 \cdot 1 + b$ $y = 8$

$b = 2$

2b slope: $\frac{2 - -1}{3 - 2} = 3$ $y = 3x - 7$

$y = 3x + b$ $5 = 3b - 7$

$-1 = 3 \cdot 2 + b$ $12 = 3b$

$b = -7$ $b = 4$

2c No such c: Suppose ~~there were a~~ $c \neq 0$. Then

$$x = \frac{1-y}{c}$$

$$= \frac{1}{c} - \frac{y}{c}.$$

I need the term $\frac{y}{c}$ to disappear and I can't do that. If $c = 0$, I get $y = 1$ which is horizontal

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3a Since $x > 0$, $x + \frac{1}{x} \geq 2 \iff x^2 + 1 \geq 2x$

$\iff x^2 - 2x + 1 \geq 0$

$\iff (x-1)^2 \geq 0$

The last bit is always true. So the inequality is true for all $x > 0$

3b $\begin{cases} x + y = 10 \\ xy = 24 \end{cases}$ 6, 4

$y = 10 - x$

$x(10 - x) = 24$ $10x - x^2 = 24$

$x^2 - 10x + 24 = 0$

$(x-6)(x-4)$

3c $x + y = -1$

$xy = 1$

$y = -1 - x$

$x(-1 - x) = 1$

$-x - x^2 = 1$

$x^2 + x + 1 = 0$

disc < 0

$$\frac{-1 \pm \sqrt{1^2 - 4 \cdot 1 \cdot 1}}{2}$$

no real solutions

So impossible