The University of Calgary
Department of Mathematics and Statistics
MATH 249,01
Quiz # 1R

Fall 2006

Name:_____**I.D.#:**_____

1. Solve for x: $|4x+1| > |2x-1|$. [3]

2. Solve for x: $\dfrac{-1}{x+2} \leq x+2.$ [3]

3. Find an equation of the line passing through the center of the circle $x^2+y^2-x=3$ and perpendicular to the line $3x-y=13$.

   . [4]

Solution

For 1)

Since both sides are always positive or 0 we can square

:$(4x+1)^2 > (2x-1)^2$ so $16x^2+8x+1 > 4x^2-4x+1$

then $12\,x^2+12x>0$ $\quad 12x\,(x+1)>0$

split points=roots $x=0,-1$, parabola open up OR

testing: $\quad -_{x=-2}\,-^{pos}\,-_{-1}\,-^{neg}\,-_{x=-0.5}\,-\,-_0\,-^{pos}\,-_{x=1}-$

so $x \in (-\infty,-1)\cup(0,+\infty)$.

For 2)

for $x \neq -2$ $\quad \dfrac{-1}{x+2} \leq x+2$

$0 \leq x+2+\dfrac{1}{x+2}$ $\quad 0 \leq \dfrac{(x+2)^2+1}{x+2} = \dfrac{x^2+4x+5}{x+2}$

the top is always positive,since the discr.$D=16-20=-4$,neg

NO real roots so the bottom must be positive

$x>-2$ $\quad$ (only one split point) $\quad x \in (-2,+\infty)$

For 3)

We can find the center by completing the square

$x^2-2\cdot\frac{1}{2}x+\frac{1}{4}+y^2=3+\frac{1}{4}$ so $\left(x-\frac{1}{2}\right)^2+y^2=3+\frac{1}{4}$,so the center is

$C(\frac{1}{2},0)$.

The given line has the slope $m=3$ since $3x-13=y$,

thus the perpendicular line has the slope $m_\perp = -\frac{1}{3}$ and an equation is $y = -\frac{1}{3}x + b$
to find b substitute the centre
$0 = -\frac{1}{3} \cdot \frac{1}{2} + b$ so $b = \frac{1}{6}$ and an equation of the line is $\quad y = -\frac{1}{3}x + \frac{1}{6}$.