lThe University of Calgary
Department of Mathematics and Statistics
MATH 249-01
Quiz # 1R

Fall 2008

Name:______________________________**I.D.#:**_________________

1. Solve for x: (a) $x+\frac{9}{x}>6$ (b) $|2x-1|\le|x+1|$. [4]

2. Find the coordinates of the vertex of the parabola $y=2x^2-8x+1$. [3]

3. Simplify and find all x for which the expressions are defined $\dfrac{1+\frac{2x}{x+1}}{x-\frac{3}{x+2}}$. [3]

Solution **For 1a)**

for $x\neq 0$ $x+\frac{9}{x}-6>0\rightarrow$ $\frac{x^2+9-6x}{x}>0\rightarrow$ $\frac{x^2-6x+9}{x}>0$
discriminant of the top is $D=0$ so double root and the top is always positive or 0
$\frac{(x-3)^2}{x}>0$ thus the bottom must be positive,too $\rightarrow x>0, x\neq 3$
Or using the split points $x=0,3$
testing $\underset{x=-1}{\overset{neg}{}}$——$_0$ $-_{x=0}$ $-^{pos}$ $-_3$ $- -\underset{x=4}{\overset{pos}{}}$ $-$
check the split points $x=0,3$ Not included ,so $x\in(0,3)\cup(3,+\infty)$.

For 1b)
always $|...|\ge 0$ so both sides positive or 0 we can square
$|2x-1|^2\le|x+1|^2\rightarrow 4x^2-4x+1\le x^2+2x+1\rightarrow 3x^2-6x\le 0$
$3x(x-2)\le 0$ parabola open up , negative between roots
OR using the split points $x=0,2$
testing $\underset{x=-1}{\overset{pos}{}}$——$_0$ $-_{x=1}$ $-^{neg}$ $-_2$ $- -\underset{x=3}{\overset{pos}{}}$ $--$
check the split points $x=0,2$ incl.;so $x\in[0,2]$.

For 2) complete the square
$y=2x^2-8x+1\rightarrow y=2(x^2-4x)+1\rightarrow y+8=2(x^2-4x+4)+1=2(x-2)^2+1$
so $y=2(x-2)^2-7$ and $V(2,-7)$

For 3)
for $x\neq-2,-1$ using $\frac{\frac{a}{b}}{\frac{c}{d}}=\frac{a}{b}\cdot\frac{d}{c}=\frac{ad}{bc}$

$$\frac{1+\frac{2x}{x+1}}{x-\frac{3}{x+2}}=\frac{\frac{x+1+2x}{x+1}}{\frac{x^2+2x-3}{x+2}}=\frac{\frac{3x+1}{x+1}}{\frac{x^2+2x-3}{x+2}}=\frac{(3x+1)(x+2)}{(x^2+2x-3)(x+1)}=\frac{(3x+1)(x+2)}{(x+3)(x-1)(x+1)}$$

for $x\neq-3,-2,-1,1$.