

The University of Calgary  
 Department of Mathematics and Statistics  
 MATH 249/01  
 Quiz # 1W

Fall 2006

Name: \_\_\_\_\_ I.D.#: \_\_\_\_\_

1. Solve for x:  $\frac{2-x}{4} \geq \frac{2}{x+1}$ . [4].
2. Solve for x:  $3 - |x+2| < 1$ . [3]
3. Find the area of the circle  $x^2 - 4x + y^2 + 3y = 0$ . [3]

**SOLUTION**

**For 1)**

$$\text{for } x \neq -1 \quad \frac{2-x}{4} - \frac{2}{x+1} \geq 0 \quad \frac{(2-x)(x+1) - 8}{4(x+1)} \geq 0$$

$$\frac{2x+2-x^2-x-8}{4(x+1)} \geq 0 \quad \frac{-x^2+x-6}{4(x+1)} \geq 0$$

the top is always negative since the disc.  $D = 1 - 4 \cdot 6 = -23$  negative,  
 no real roots, parabola open down

thus the bottom must be also negative  $x < -1$

Or split points " $\frac{0}{0}$ " only  $x = -1$

testing

$$\begin{matrix} - & - & \text{pos} & - & - & -1 & - & - & x=0 & - & \text{neg} & - & - \end{matrix}$$

check the split points, then the solution is  $x \in (-\infty, -1)$

**For 2)**

$$3 - |x+2| < 1 \quad 2 < |x+2|$$

distance to  $-2$  must be bigger than 2 so  $x < -4$  or  $x > 0$

$$\text{OR square both sides} \quad 4 < x^2 + 4x + 4 \quad 0 < x(x+4)$$

testing

$$\begin{matrix} - & - & \text{pos} & - & - & x=-5 & - & - & -4 & - & x=-3 & - & \text{neg} & - & - & 0 & - & x=1 & - & \text{pos} & - & - \end{matrix}$$

$x \in (-\infty, -4) \cup (0, +\infty)$

**For 3)**

for the area we need the radius so complete the square

$$x^2 - 4x + 4 + y^2 + 2 \cdot \frac{3}{2}y + \frac{9}{4} = 0 + 4 + \frac{9}{4}$$

$$(x-2)^2 + \left(y + \frac{3}{2}\right)^2 = \left(\frac{5}{2}\right)^2 \text{ so the center is at } \left(2, -\frac{3}{2}\right),$$

the radius  $r = \frac{5}{2}$  and the area  $A = \pi \frac{25}{4}$ .