

### Quiz #3

Math 130, Section 21, David Beydler

Directions: Show all work to get full credit. No calculators, books, notes. Please box your answers. Good luck!

(15 points total)

Name: Solution  
 Wednesday, September 21, 2011

1. (3 points) Solve the rational inequality and write the solution set in interval notation.

$$\frac{10}{3+2x} \leq 5$$

$$\frac{10}{3+2x} - 5 \leq 0$$

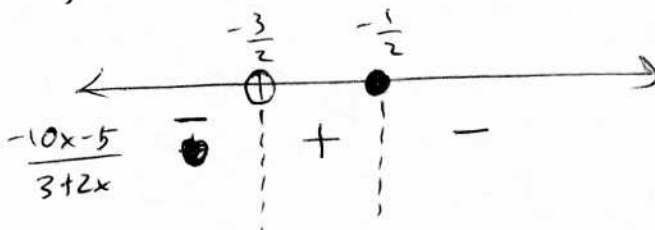
$$\frac{10}{3+2x} - \frac{5(3+2x)}{3+2x} \leq 0$$

$$\frac{10 - 15 - 10x}{3+2x} \leq 0$$

$$\frac{-10x - 5}{3+2x} \leq 0$$

$\frac{-10x-5}{3+2x}$  might change signs when  $-10x-5=0$   
 or  $3+2x=0$

So, when  $x = -\frac{1}{2}$  or  $x = -\frac{3}{2}$ .



$$\left(-\infty, -\frac{3}{2}\right) \cup \left[-\frac{1}{2}, \infty\right)$$

Third times a charm!

2. (2 points) Find the distance from  $P(-3,4)$  to  $Q(3,-2)$ .

Distance  $\sqrt{(3-4)^2 + (-2-4)^2}$   
 $= \sqrt{(-1)^2 + (-6)^2}$   
 $= \sqrt{1+36}$

~~Distance  $\sqrt{(4-(-3))^2 + (-2-4)^2}$~~   
 Distance  $= \sqrt{(3-(-3))^2 + (-2-4)^2}$   
 $= \sqrt{6^2 + (-6)^2}$   
 $= \sqrt{36+36} = \sqrt{72} = 6\sqrt{2}$

3. (3 points) Given that the midpoint of a segment is  $(5,8)$ , and one endpoint is  $(13,10)$ , find the coordinates for the other endpoint.

Let  $(x,y)$  be other endpoint,

$$\frac{x+13}{2} = 5$$

$$\frac{y+10}{2} = 8$$

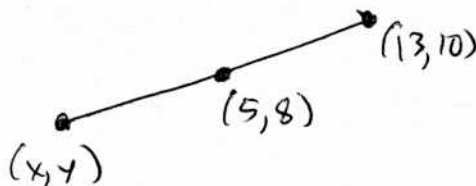
$$x+13=10$$

$$y+10=16$$

$$x=-3$$

$$y=6$$

$$\boxed{(-3, 6)}$$



4. (3 points) Find the center and radius of the circle whose graph is given by the equation:

$$4x^2 + 4y^2 + 4x - 16y - 19 = 0$$

$$x^2 + y^2 + x - 4y - \frac{19}{4} = 0 \quad \text{Divide by 4}$$

$$\left(x^2 + x + \frac{1}{4}\right) + (y^2 - 4y + 4) = \frac{19}{4} + \frac{1}{4} + 4$$

$$\left(x + \frac{1}{2}\right)^2 + (y - 2)^2 = 9$$

Center:  $\left(-\frac{1}{2}, 2\right)$   
Radius: 3

5. (1 point) Does the following relation define a function?

$$\{(5,1), (3,4), (4,1), (-1,24)\}$$

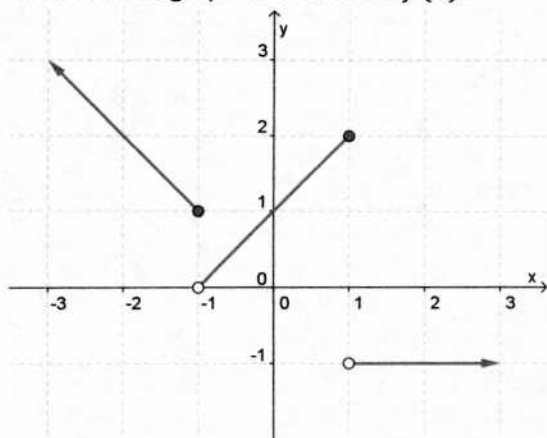
Yes

6. (1 point) Does the following relation define  $y$  as a function of  $x$ ?

$$x + y > 2$$

No (since  $(1,2)$  and  $(1,3)$  ~~are~~ are solutions)

7. Here's the graph of a function  $f(x)$ .



a. (1 point) Find the interval(s) where  $f(x)$  is increasing.

~~REDA~~  $(-1, 1]$

b. (1 point) Find the interval(s) where  $f(x)$  is decreasing.

$(-\infty, -1]$