Key

250

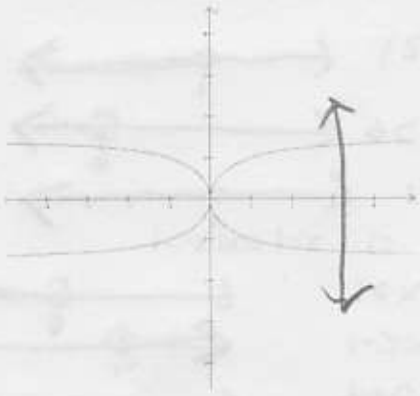
Name:_____

Math 95
Summer 2007
Test #1

1) Correctly categorize the graphs as a function or just a relation. Justify your answer.

/10

a) Function
passes vertical line test



b) relation
does not pass vertical line test

2) Consider the function $f(x) = 2x^2 + x$

a) Use set or interval notation to describe the domain of f(x)

/30

Domain = $\{x \mid x \in R\}$ or $(-\infty, \infty)$ /6

b) Evaluate f(2)

$f(2) = 2(2)^2 + 2 = 2(4) + 2 = 10$ /7

c) Evaluate f(a+1)

/7

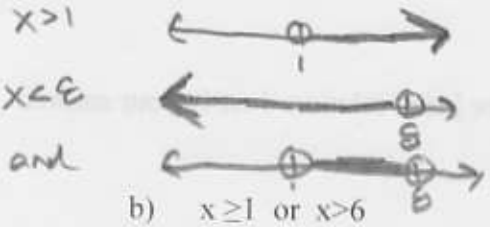
$f(a+1) = 2(a+1)^2 + (a+1)$
$= 2(a^2 + 2a + 1) + a + 1$
$= 2a^2 + 4a + 2 + a + 1$
$= 2a^2 + 5a + 3$

(30)

3) Use interval notation to describe the solutions for the following inequalities.

a) $1<x<8$ $\Rightarrow$ $x<8$ and $x>1$

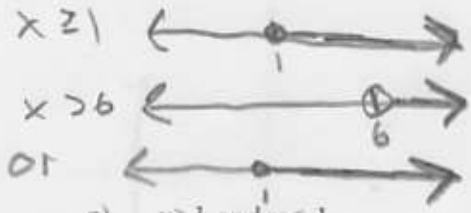
1/7



Solution $(1,8)$

b) $x \geq 1$ or $x>6$

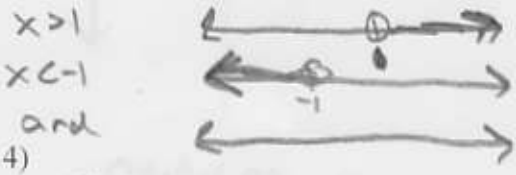
1/7



Solution $[1,\infty)$

c) $x>1$ and $x<-1$

1/6



Solution = $\emptyset$

4)

a) Find a linear function parallel to $3x+2y=1$ with a .y-intercept=(0,1).

$y=mx+b$ where parallel to $3x+2y=1$

1/10 $\boxed{y=-\frac{3}{2}x+1}$

$2y=-3x+1$

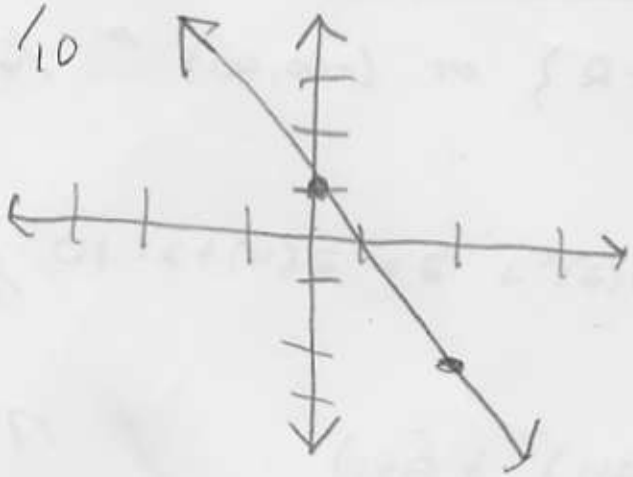
$y=-\frac{3}{2}x+\frac{1}{2}$

slope $=-\frac{3}{2}$

$m=-3/2$ $b=1$

b) Graph the function of the line determined in part a:

1/10



(40)

5) Find all solutions to the following absolute value: $2|x|-6=3$

$2|x|-6=3$

$2|x|=9$

$|x|=\frac{9}{2}$

$x=\pm\frac{9}{2}$

/20

$x=\frac{9}{2}$ or $x=-\frac{9}{2}$

6) For the function $f(x)=\frac{1}{x^2-9}$

a) Describe the domain of f(x) using set or interval notation.

Restriction on domain when $x^2-9=0$

/10 $x^2-9=0 \Rightarrow (x+3)(x-3)=0$ when $x=3$ or $x=-3$

Domain: $\{x \mid x\neq 3 \text{ or } x\neq -3\}$

b) List any vertical asymptotes of f(x). (Remember vertical asymptotes are lines.)

Vertical Asymptotes

/10

$x=3$ and $x=-3$

(40)

7) Simplify the following rational expression:

$$\frac{x^2-25}{x^2+10x+25} = \frac{(x+5)(x-5)}{(x+5)(x+5)} = \frac{x-5}{x+5}$$

/20

8) Multiply and if possible simplify the following rational expression:

$$\frac{5a^3}{3b} * \frac{7b^3}{10a^7} = \frac{5a^3 \cdot 7b^3}{3b \cdot 5 \cdot 2 \cdot a^7 a^4} = \frac{7b^2}{6a^4}$$

/20

40

9) Divide and if possible simplify the following rational expression:

$$\frac{9x^5}{8y^2} \div \frac{3x}{16y^9}$$

$$= \frac{9x^5}{8y^2} \cdot \frac{16y^9}{3x} = \frac{3 \cdot x^4 \cdot 8 \cdot 2 \cdot y^7}{8 \cdot x \cdot 3 \cdot x}$$

$$= 6x^4y^7$$

/20

10) Subtract the following Rational Expressions:

$$\frac{x-7}{x^2-16} - \frac{x-1}{16-x^2}$$

$$= \frac{x-7}{x^2-16} - \frac{-1(x-1)}{(-1)(16-x^2)}$$

/20

$$= \frac{x-7}{x^2-16} + \frac{x-1}{x^2-16}$$

$$= \frac{2x-8}{x^2-16} = \frac{2(x-4)}{(x+4)(x-4)} = \frac{2}{x+4}$$

(4)

11) Simplify the following complex rational expression:

/20

$$\frac{a^{-1}+b^{-1}}{\frac{a^2-b^2}{ab}} = \frac{\frac{1}{a}+\frac{1}{b}}{\frac{a^2-b^2}{ab}} \qquad LCD = ab$$

$$\frac{\left[\frac{1}{a}+\frac{1}{b}\right]ab}{\left[\frac{a^2-b^2}{ab}\right]ab} = \frac{b+a}{a^2-b^2} = \frac{a+b}{(a+b)(a-b)} = \frac{1}{a-b}$$

12) Solve the following rational equation: (make sure to check your domain)

$$\frac{x^2+4}{x-1} = \frac{5}{x-1}$$

Domain $\{x \mid x \neq 1\}$

$LCD = x-1$

$$(x-1)\left(\frac{x^2+4}{x-1}\right) = \left(\frac{5}{x-1}\right)(x-1)$$

/20

$$x^2+4=5$$

$$x^2=1$$

$$x=\pm 1$$

but $x=1$ is not in domain

Solution

$x=-1$

40

13) Solve the following rational equation: (make sure to check your domain)

$$\frac{y+3}{y+2} - \frac{y}{y^2-4} = \frac{y}{y-2}$$

$\text{DOM} = \{x \mid x \neq \pm 2\}$

$\text{LCD} = (y+2)(y-2)$

$$(y+2)(y-2)\left[\frac{y+3}{y+2} - \frac{y}{(y+2)(y-2)}\right] = (y+2)(y-2)\left[\frac{y}{y-2}\right]$$

$$\Rightarrow (y-2)(y+3) - y = y(y+2)$$

$$\Rightarrow y^2 + 3y - 2y - 6 - y = y^2 + 2y$$

$$-6 = 2y$$

$$\boxed{-3 = y}$$

/20

(20)