Math 114
Midterm 1
Mon Apr 28, 2008

Name: _____

YOU MUST SHOW LOGICAL, NEAT AND ORGANIZED WORK TO EARN FULL CREDIT

Solve for x.

[1] $11 - 5|x - 1| = 1$ **[10 POINTS]**

$-5|x-1| = -10$

$|x-1| = 2$

$x-1 = 2$ OR $x-1 = -2$

$x = 3$ OR $x = -1$

[2] $|3 - 2x| > 9$ **[10 POINTS]**

$3-2x > 9$ OR $3-2x < -9$

$-2x > 6$ OR $-2x < -12$

$x < -3$ OR $x > 6$

Solve using elimination. Write your final answer in (x, y) form.

[3] $2x + 3y = 4$ $*-5$
$5x + 4y = 17$ $*2$ **[10 POINTS]**

$-10x - 15y = -20$
$10x + 8y = 34$

$-7y = 14$
$y = -2$

$2x + 3(-2) = 4$
$2x - 6 = 4$
$2x = 10$
$x = 5$

$(5, -2)$

Write an equation for the following problem, then solve.

[4] A number divided by four is equal to twelve divided by the sum of that number and two. **[10 POINTS]**

$\frac{x}{4} = \frac{12}{x+2}$

$x(x+2) = 48$

$x^2 + 2x = 48$

$x^2 + 2x - 48 = 0$

$(x+8)(x-6) = 0$

$x = -8$ OR $x = 6$

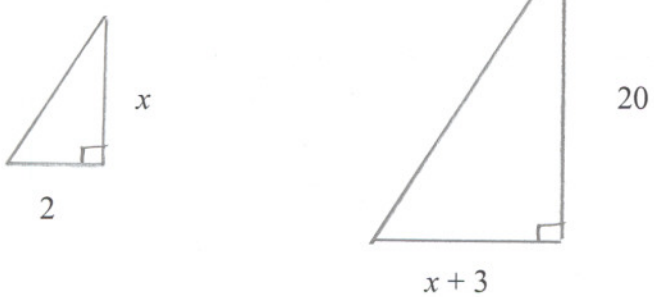
Write a proportion for the following problem. YOU DO NOT NEED TO SOLVE THE PROPORTION.

[5] A car can travel 392 kilometers on 25 liters of gas. **[5 POINTS]**
How many liters of gas does it need to travel 554 kilometers ?

$\frac{392}{25} = \frac{554}{x}$

Solve for x in the following similar triangles.

[6] **[10 POINTS]**



$\frac{x}{2} = \frac{20}{x+3}$

$x(x+3) = 40$

$x^2 + 3x = 40$

$x^2 + 3x - 40 = 0$

$(x+8)(x-5) = 0$

~~$x = -8$~~ OR $x = 5$

$x = 5$

Simplify.

[7] $\dfrac{6x^2-5x-4}{6x^2-9x-6}$

[10 POINTS]

$= \dfrac{(2x+1)(3x-4)}{3(2x+1)(x-2)}$

$= \dfrac{3x-4}{3(x-2)}$

$6x^2-5x-4 \qquad 6(-4)=-24=RS$

$= 6x^2-8x+3x-4 \qquad -5=R+S$

$= 2x(3x-4)+1(3x-4) \qquad -8,3$

$= (2x+1)(3x-4)$

$6x^2-9x-6$

$= 3(2x^2-3x-2) \qquad 2(-2)=-4=RS$

$= 3(2x^2-4x+x-2) \qquad -3=R+S$

$= 3(2x(x-2)+1(x-2)) \qquad -4,1$

$= 3(2x+1)(x-2)$

[8] $\dfrac{\dfrac{2}{x-3}-2}{4+\dfrac{1}{x-3}} \cdot \dfrac{(x-3)}{(x-3)}$

[10 POINTS]

$= \dfrac{2-2(x-3)}{4(x-3)+1}$

$= \dfrac{2-2x+6}{4x-12+1}$

$= \dfrac{-2x+8}{4x-11}$

[9] $\dfrac{\dfrac{2}{x+1}+\dfrac{3}{x}}{\dfrac{5}{x+1}+\dfrac{2}{x}} \cdot \dfrac{x(x+1)}{x(x+1)}$

[10 POINTS]

$= \dfrac{2x+3(x+1)}{5x+2(x+1)}$

$= \dfrac{2x+3x+3}{5x+2x+2}$

$= \dfrac{5x+3}{7x+2}$

Perform the algebraic operations and simplify.

[10] $\dfrac{x^2+2x-15}{x^2+3x-10}\cdot\dfrac{x^2-9x+14}{x^2-9}$ **[10 POINTS]**

$$=\frac{(x+5)(x-3)}{(x+5)(x-2)}\cdot\frac{(x-2)(x-7)}{(x-3)(x+3)}$$

$$=\frac{x-7}{x+3}$$

[11] $\dfrac{9x^2-25}{3x-3}\div\dfrac{9x-15}{x^2-1}$ **[10 POINTS]**

$$=\frac{(3x+5)(3x-5)}{3(x-1)}\cdot\frac{(x+1)(x-1)}{3(3x-5)}$$

$$=\frac{(3x+5)(x+1)}{9}$$

[12] $\dfrac{2x^2+3x}{x^2-9}-\dfrac{x^2+18}{x^2-9}$ **[10 POINTS]**

$$=\frac{2x^2+3x-x^2-18}{x^2-9}$$

$$=\frac{x^2+3x-18}{x^2-9}$$

$$=\frac{(x+6)(x-3)}{(x+3)(x-3)}$$

$$=\frac{x+6}{x+3}$$

[13] $\dfrac{2}{x-2}-\dfrac{x}{x-3}$ **[10 POINTS]**

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

$$=\frac{2x-6-x^2+2x}{(x-2)(x-3)}$$

$$=\frac{-x^2+4x-6}{(x-2)(x-3)}$$

b^2-4ac

$=4^2-4(-1)(-6)$

$=-8$ NOT FACTORABLE

[14] $\dfrac{x+1}{x^2-3x+2}-\dfrac{x-2}{x^2-5x+6}$ **[15 POINTS]**

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

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

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

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

$$= \frac{x-5}{(x-1)(x-2)(x-3)}$$

Solve for *b*.

[15] $\dfrac{2}{a}-\dfrac{5}{b}=3$ **[10 POINTS]**

$$ab\left(\frac{2}{a}-\frac{5}{b}\right)=3(ab)$$

$$2b-5a=3ab$$

$$2b-3ab=5a$$

$$b(2-3a)=5a$$

$$b=\frac{5a}{2-3a}$$