Math 114 (8:30am – 9:20am)
Midterm 1
Wed Oct 13, 2010

Name you asked to be called: _____

SCORE: _____ / 140 POINTS

- **ALL PROBLEMS MUST BE SOLVED ALGEBRAICALLY TO EARN CREDIT (NO GUESS & CHECK)**
- **PUT A BOX AROUND EACH FINAL ANSWER**
- **SHOW COMPLETE AND PROPER WORK TO EARN FULL CREDIT**

Write a proportion for, but **DO NOT SOLVE**: **SCORE: ___ / 4 POINTS**

If 132 US dollars is equivalent to 881 Swedish kronor, 187 Swedish kronor is equivalent to how many US dollars ?

$$\frac{132}{881} = \frac{x}{187}$$

Simplify: $\dfrac{2x^2-7x+6}{3x^2-4x-4}$ **SCORE: ___ / 10 POINTS**

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

$$= \boxed{\frac{2x-3}{3x+2}}$$

Solve: A number divided by ten is equal to four divided by three less than that number. Find the number. **CHECK YOUR ANSWER(S).** **SCORE: ___ / 10 POINTS**

$$\frac{x}{10} = \frac{4}{x-3}$$

$$x(x-3) = 40$$

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

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

$$\boxed{x = 8, -5}$$

CHECK!

$x = 8$ $\quad \frac{8}{10} = \frac{4}{5}$ ✓

$x = -5$ $\quad \frac{-5}{10} = -\frac{1}{2}$

$\frac{4}{-8} = -\frac{1}{2}$ ✓

Solve: The area of a rental storage unit varies directly as its monthly rent and inversely as its height. **SCORE: ___ / 12 POINTS**
A 30 square foot storage unit that is 7 feet tall rents for \$75 per month. What is the area of an 8 foot tall storage unit that rents for \$120 per month ? **FOR FULL CREDIT, YOU MUST IDENTIFY WHAT ALL YOUR VARIABLES REPRESENT, FIND THE SPECIFIC EQUATION CONNECTING THEM, AND SUMMARIZE YOUR FINAL ANSWER IN A SENTENCE USING THE CORRECT UNITS OF MEASUREMENT.**

a = AREA
r = RENT
h = HEIGHT

$a = \frac{kr}{h}$

$30 = \frac{k(75)}{7}$

$k = \frac{14}{5}$ OR 2.8

$a = \frac{2.8r}{h}$

$a = \frac{2.8(120)}{8}$

$a = 42$

THE STORAGE UNIT IS 42 SQUARE FEET.

Solve for x: $\frac{3}{x^2-x-2} - \frac{2}{x^2-2x} = \frac{2}{x^2+x}$ **CHECK YOUR ANSWER(S)** **SCORE: ___ / 12 POINTS**

$$x(x+1)(x-2)\left[\frac{3}{(x-2)(x+1)} - \frac{2}{x(x-2)}\right] = \left[\frac{2}{x(x+1)}\right]x(x+1)(x-2)$$

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

CHECK:

$\frac{3}{0} - \frac{2}{0} = \frac{2}{6}$

↑ ↑ UNDEFINED

NO SOLUTION

Divide and simplify: $\frac{4x^2-9}{6x-12} \div \frac{4x^2-6x}{9x-18}$ **SCORE: ___ / 10 POINTS**

$$= \frac{4x^2-9}{6x-12} \cdot \frac{9x-18}{4x^2-6x}$$
$$= \frac{(2x+3)(2x-3)}{6(x-2)} \cdot \frac{9(x-2)}{2x(2x-3)}$$
$$= \frac{3(2x+3)}{4x}$$

Simplify: $\dfrac{\frac{3}{x+2}-\frac{5}{x}}{\frac{7}{x}+\frac{1}{x+2}} \cdot \dfrac{x(x+2)}{x(x+2)}$

SCORE: ___ / 10 POINTS

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

$= \dfrac{3x-5x-10}{7x+14+x}$

$= \dfrac{-2x-10}{8x+14}$

$= \dfrac{-2(x+5)}{2(4x+7)} = \boxed{\dfrac{-(x+5)}{4x+7}}$

Subtract and simplify: $\dfrac{4x^2-5x+12}{x^2+2x-15} - \dfrac{3x^2+4x-6}{x^2+2x-15}$

SCORE: ___ / 10 POINTS

$= \dfrac{x^2-9x+18}{x^2+2x-15}$

$= \dfrac{(x-3)(x-6)}{(x-3)(x+5)} = \boxed{\dfrac{x-6}{x+5}}$

Simplify: $\dfrac{\frac{4}{x-3}-5}{7+\frac{2}{x-3}} \cdot \dfrac{x-3}{x-3}$

SCORE: ___ / 10 POINTS

$= \dfrac{4-5(x-3)}{7(x-3)+2}$

$= \dfrac{4-5x+15}{7x-21+2} = \boxed{\dfrac{-5x+19}{7x-19}}$

Multiply and simplify: $\dfrac{2x^2-32}{x^2-7x+6} \cdot \dfrac{x^2-3x-18}{x^2-x-12}$

SCORE: ___ / 10 POINTS

$= \dfrac{2(x^2-16)}{(x-1)(x-6)} \cdot \dfrac{(x-6)(x+3)}{(x-4)(x+3)}$

$= \dfrac{2(x-4)(x+4)}{(x-1)(x-6)} \cdot \dfrac{(x-6)(x+3)}{(x-4)(x+3)}$

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

Subtract and simplify: $\dfrac{x+1}{x^2+5x+6} - \dfrac{x-1}{x^2+7x+10}$

SCORE: ___ / 12 POINTS

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

$$= \frac{x^2+6x+5-(x^2+2x-3)}{(x+2)(x+3)(x+5)}$$

$$= \frac{4x+8}{(x+2)(x+3)(x+5)} = \frac{4(x+2)}{(x+2)(x+3)(x+5)} = \boxed{\frac{4}{(x+3)(x+5)}}$$

Fill in the blanks: The equation of the vertical asymptote for $y = \dfrac{7-6x}{10x+5}$ is $x = -\frac{1}{2}$.

SCORE: ___ / 10 POINTS

$10x+5=0$

The equation of the horizontal asymptote for $y = \dfrac{7-6x}{10x+5}$ is $y = -\frac{3}{5}$.

$y \approx \frac{-6x}{10x}$

Add and simplify: $\dfrac{3}{x-1} + \dfrac{x+4}{x-4}$

SCORE: ___ / 10 POINTS

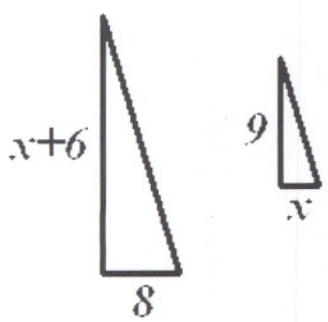
$$= \frac{3(x-4)+(x+4)(x-1)}{(x-1)(x-4)}$$

$$= \frac{3x-12+x^2+3x-4}{(x-1)(x-4)}$$

$$= \frac{x^2+6x-16}{(x-1)(x-4)} = \boxed{\frac{(x+8)(x-2)}{(x-1)(x-4)}}$$

Solve for x in the following similar triangles:

SCORE: ___ / 10 POINTS



$$\frac{x+6}{9} = \frac{8}{x}$$

$$x(x+6) = 72$$

$$x^2+6x-72=0$$

$$(x+12)(x-6)=0$$

$$x = -12, \boxed{6}$$