Math 114
Midterm 2
Tue Oct 27, 2009

Name: _____

➡ **YOU MUST SHOW LOGICAL AND ORGANIZED ALGEBRAIC WORK TO EARN FULL CREDIT**
➡ **PUT A BOX AROUND YOUR FINAL ANSWER**

Solve: The weight of a drum of hazardous waste varies jointly as its height and the area of its lid. **SCORE: ___ / 12 POINTS**
If a 150 pound drum of hazardous waste is 3 feet tall with a lid of 4 square feet, find the height of a 120 lb drum of hazardous waste with a lid of 5 square feet.
FOR FULL CREDIT, YOU MUST FOLLOW THE COMPLETE PROCEDURE SHOWN IN CLASS.
SUMMARIZE YOUR ANSWER IN A SENTENCE, INCLUDING UNITS.

w = WEIGHT OF DRUM (lb)
h = HEIGHT " (ft)
a = AREA OF LID (sq ft)

$w = kha$
$150 = k(3)(4)$
$k = 12.5$

$w = 12.5ha$
$120 = 12.5h(5)$
$120 = 62.5h$
$h = 1.92$

A 120 lb DRUM WITH A 5 SQUARE FOOT LID IS 1.92 FEET TALL

Solve for x: $10 - |4 - x| = 7$ **CHECK YOUR ANSWER(S)** **SCORE: ___ / 10 POINTS**

$-|4-x| = -3$
$|4-x| = 3$
$4 - x = 3$ OR $4 - x = -3$
$-x = -1$ OR $-x = -7$
$\boxed{x = 1 \text{ OR } x = 7}$

CHECK:
$x = 1$
$10 - |4 - 1| = 10 - |3| = 10 - 3 = 7$ ✓

$x = 7$
$10 - |4 - 7| = 10 - |-3| = 10 - 3 = 7$ ✓

Fill in the blanks: The equation of the horizontal asymptote for $y = \dfrac{3-6x}{13x+7}$ is $y = \dfrac{-6}{13}$. **SCORE: ___ / 6 POINTS**

$y \approx \dfrac{-6x}{13x} = \dfrac{-6}{13}$

The equation of the vertical asymptote for $y = \dfrac{3-6x}{13x+7}$ is $x = \dfrac{-7}{13}$.

$13x + 7 = 0$
$x = \dfrac{-7}{13}$

Solve: Twelve divided by a number equals the number plus five divided by three. Find all possible values for the number. **CHECK YOUR ANSWER(S).**

SCORE: ___ / 10 POINTS

$\frac{12}{x} = \frac{x+5}{3}$

$36 = x^2+5x$

$0 = x^2+5x-36$

$0 = (x+9)(x-4)$

$\boxed{x = -9, 4}$

CHECK!

$x=-9$

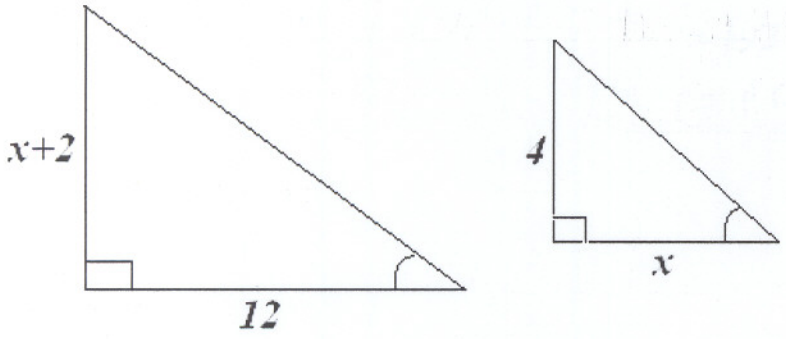
$\frac{12}{-9} = -\frac{4}{3}$, $\frac{-9+5}{3} = -\frac{4}{3}$ ✓

$x=4$

$\frac{12}{4} = 3$, $\frac{4+5}{3} = \frac{9}{3} = 3$ ✓

Solve for x:

SCORE: ___ / 10 POINTS



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

$x^2+2x=48$

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

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

~~$x=-8$~~ OR $\boxed{x=6}$

Solve for x: $|7-3x| \geq 2$

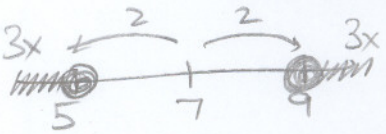
SCORE: ___ / 10 POINTS

$7-3x \geq 2$ OR $7-3x \leq -2$

$-3x \geq -5$ OR $-3x \leq -9$

$\boxed{x \leq \frac{5}{3} \text{ OR } x \geq 3}$

OR



$3x \leq 5$ OR $3x \geq 9$

$\boxed{x \leq \frac{5}{3} \text{ OR } x \geq 3}$

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

SCORE: ___ / 10 POINTS

$$= \frac{x+5}{x+3}\cdot\frac{x-2}{x-2} - \frac{x-4}{x-2}\cdot\frac{x+3}{x+3}$$

$$= \frac{x^2+3x-10-(x^2-x-12)}{(x+3)(x-2)} = \frac{4x+2}{(x+3)(x-2)} = \boxed{\frac{2(2x+1)}{(x+3)(x-2)}}$$

Subtract and simplify: $\dfrac{x+2}{x^2+x-12}-\dfrac{x-1}{x^2-6x+9}$

$x^2+x-12=(x+4)(x-3)$

$x^2-6x+9=(x-3)^2$

$LCD=(x+4)(x-3)^2$

SCORE: ___ / 12 POINTS

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

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

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

Divide and simplify: $\dfrac{8x^2+12x}{x^3-5x^2+6x}\div\dfrac{4x^2-9}{x^2+3x-18}$

SCORE: ___ / 10 POINTS

$$= \frac{4x(2x+3)}{x(x^2-5x+6)}\cdot\frac{x^2+3x-18}{4x^2-9}$$

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

Simplify: $\dfrac{6x^2-5x-4}{4x^2-4x-3}$

SCORE: ___ / 10 POINTS

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

$$= \boxed{\frac{3x-4}{2x-3}}$$

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

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

$= \dfrac{5x-2x+6}{3x-9+4x}$

$= \dfrac{3x+6}{7x-9} = \boxed{\dfrac{3(x+2)}{7x-9}}$

SCORE: ___ / 10 POINTS

Solve for x: $\dfrac{2}{x+1}-\dfrac{1}{x^2+x}=\dfrac{1}{x}$ **CHECK YOUR ANSWER(S)**

SCORE: ___ / 12 POINTS

LCD $= x(x+1)$

$x(x+1)\left(\dfrac{2}{x+1}-\dfrac{1}{x(x+1)}\right) = x(x+1)\left(\dfrac{1}{x}\right)$

$2x-1 = x+1$

$\boxed{x=2}$

CHECK:

$\dfrac{2}{2+1}-\dfrac{1}{2^2+2}$

$= \dfrac{2}{3}-\dfrac{1}{6}$

$= \dfrac{4}{6}-\dfrac{1}{6}$

$= \dfrac{3}{6} = \dfrac{1}{2}$ ✓

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

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

$= \dfrac{7+3x-6}{4-5x+10}$

$= \boxed{\dfrac{3x+1}{14-5x}}$

SCORE: ___ / 10 POINTS

Add and simplify: $\dfrac{3x^2+2x-5}{x^2-5x-6}+\dfrac{3-3x-2x^2}{x^2-5x-6}$

SCORE: ___ / 8 POINTS

$= \dfrac{x^2-x-2}{x^2-5x-6}$

$= \dfrac{(x-2)(x+1)}{(x-6)(x+1)} = \boxed{\dfrac{x-2}{x-6}}$