Test #1, Math 115

Sep 22nd, 2006

Name:_____

Direction: Please *print* your name. And *show your work for credit.*

1. Multiply and simplify your answer:(10 points)

$$(x-3)(2x^2-x+2)$$

$$= 2x^3 - x^2 + 2x - 6x^2 + 3x - 6$$

$$= 2x^3 - 7x^2 + 5x - 6$$

2. Factor the following polynomial completely relative to the integers:(10 points)

$$x^4 - 27x$$

$$= x(x^3 - 27)$$

$$= x(x^3 - 3^3)$$

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

3. Multiply and simplify answer to the lowest terms:(10 points)

$$\frac{9-x^2}{x^2-6x+8} \cdot \frac{x-2}{x-3}$$

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

$$= \frac{-(3+x)}{(x-4)} = \frac{3+x}{4-x} \quad \text{or} \quad \frac{-3-x}{x-4}$$

8. Solve the system of linear equations:(10 points)

$$\begin{cases} 3x+y=9 & (1) \\ -2x+3y=5 & (2) \end{cases}$$

from (1) $\Rightarrow$ $y = 9-3x$

$$-2x+3(9-3x)=5$$
$$-2x+27-9x=5$$
$$22=11x$$
$$x=2$$

$3\cdot 2+y=9$

$\Rightarrow y=3$

$\Rightarrow \begin{cases} x=2 \\ y=3 \end{cases}$

9. Solve the inequality with absolute value *show your answer in both inequality notation and interval notation:*(10 points)

$$|3x-4|<2$$

$|3x-4|<2 \Rightarrow -2<3x-4<2$

$-2+4<3x<2+4$

$2<3x<6$

$\frac{2}{3}<x<2$

$(\frac{2}{3}, 2)$

10. An boat take $\frac{5}{3}$ times as long to go 150 miles up a river than to return. If the boat curises at 8 miles per hour in still water, what is the rate of the current? (10 points)

Assume the rate of current is x miles per hour

$$\frac{150}{8-x} = \frac{5}{3}\cdot\frac{150}{8+x}$$ (Divid by 150 both sides)

$$\frac{1}{8-x} = \frac{5}{3}\,\frac{1}{8+x}$$

$$3(8+x)=5(8-x)$$
$$24+3x=40-5x$$
$$8x=16$$
$$x=2$$

4. Simplify and express answer using positive exponent only:(10 points)

$$\left(\frac{27xy^2}{8x^{-2}y^{-4}}\right)^{\frac{1}{3}}$$

$$= \left(\frac{27}{8}x^{1-(-2)}y^{2-(-4)}\right)^{\frac{1}{3}} = \frac{27^{\frac{1}{3}}}{8^{\frac{1}{3}}}x^{3\cdot\frac{1}{3}}y^{6\cdot\frac{1}{3}}$$

$$= \frac{3}{2}xy^2 \quad \text{or} \quad \frac{3xy^2}{2}$$

5. Write the following number in scientific notation:(10 points)

0.0000001176 ← 7 steps to the left

1.176×10^{-7}

6. Rationalize denominator and write in simplified form:(10 points)

$$\frac{2}{\sqrt[3]{2}-1}$$

$$= \frac{2(\sqrt[3]{4}+\sqrt[3]{2}+1)}{(\sqrt[3]{2}-1)(\sqrt[3]{4}+\sqrt[3]{2}+1)}$$

$$= \frac{2(\sqrt[3]{4}+\sqrt[3]{2}+1)}{(\sqrt[3]{2})^3-1^3} = 2\left(\sqrt[3]{4}+\sqrt[3]{2}+1\right)$$

or $2\sqrt[3]{4}+2\sqrt[3]{2}+2$

7. Solve the linear equation:(10 points)

$$\frac{x-1}{2}-\frac{5}{6}=\frac{3x-2}{9}$$

LCD = 18

$$18\cdot\frac{x-1}{2} - 18\cdot\frac{5}{6} = 18\cdot\frac{3x-2}{9}$$

$$9(x-1) - 3\cdot 5 = 2(3x-2)$$

$$9x-9-15 = 6x-4$$

$$3x = 15+9-4$$

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