NAME:__________________ Test___ Date:___ MATH 131 Spring 2009 Tigran Mkrtchyan

YOU MUST SHOW ALL OF YOUR WORK to receive full credit for the problem. The more work you show on your paper leading to your solution will give me more opportunity to award partial credit. **Clearly indicate your solution** to the problem.

1) *(4 points)* Find the product. $[(2x+y)+2]^2$.

$[(2x+y)+2]^2=(2x+y)^2+2(2)(2x+y)+2^2=4x^2+4xy+y^2+4(2x+y)+4=4x^2+4xy+y^2+8x+4y+4$

2) *(4 points)* Factor $2(t-s)+4(t-s)^2-(t-s)^3=(t-s)(2+4(t-s)-(t-s)^2)=(t-s)(2+4t-4s-(t^2-2ts+s^2))=(t-s)(2+4t-4s-t^2+2ts-s^2)$

3) *(4 points)* Factor $-16m^3+4m^2p^2-4pm+p^3=4m^2(-4m+p^2)+p(-4m+p^2)=(4m^2+p)(-4m+p^2)$

4) *(4 points)* Factor $5q^{-3}+8q^{-2}=q^{-3}(5+8q)$

5) *(4 points)* Factor $r^2(r-s)-5rs(s-r)-6s^2(r-s)=r^2(r-s)-5rs(-1)(r-s)-6s^2(r-s)=r^2(r-s)+5rs(r-s)-6s^2(r-s)=$
$(r-s)(r^2+5rs-6s^2)=(r-s)(r-s)(r+6s)$

6) *(4 points)* Solve the equation. $2x^2-12-4x=x^2-3x$.
$2x^2-12-4x=x^2-3x$
$2x^2-x^2-12-4x+3x=0$
$x^2-x-12=0$
$(x-4)(x+3)=0$
$x=4$ or $x=-3$

7) *(4 points)* Multiply and write in lowest terms. $\frac{a^2-1}{4a}\cdot\frac{2}{1-a}$

$$\frac{(a-1)(a+1)\cdot 2}{4a(1-a)}=\frac{-(1-a)(a+1)\cdot 2}{4a(1-a)}=\frac{-(a+1)}{2a}=\frac{-a-1}{2a}$$

8) *(4 points)* Multiply and write in lowest terms. $\frac{8x^3-27}{2x^2-18}\cdot\frac{2x+6}{8x^2+12x+18}$

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

9) *(4 points)* Add or subtract and simplify. $\frac{x}{x-y}-\frac{y}{y-x}$

$$\frac{x}{x-y}-\frac{y}{y-x}=\frac{x}{x-y}-\frac{y}{-(x-y)}=\frac{x}{x-y}+\frac{y}{x-y}=\frac{x+y}{x-y}$$

10) *(4 points)* p varies jointly as q and r^2, and p=200 when q=2 and r=3. Find p when q=5 and r=2.

$$p=kqr^2$$
$$200=k\cdot 2\cdot 3^2$$
$$200=18k$$
$$k=\frac{200}{18}=\frac{100}{9}$$

So the equation of the variation is $p=\frac{100}{9}qr^2$

$$p=\frac{100}{9}\cdot 5\cdot 2^2=\frac{100\cdot 20}{9}=\frac{2000}{9}$$

11) *(4 points)* Solve the equation. $\frac{6}{w+3}+\frac{-7}{w-5}=\frac{-48}{w^2-2w-15}$

$$\frac{6}{w+3}+\frac{-7}{w-5}=\frac{-48}{(w+3)(w-5)}$$
$$(w+3)(w-5)\frac{6}{w+3}+(w+3)(w-5)\frac{(-7)}{w-5}=\frac{-48(w+3)(w-5)}{(w+3)(w-5)}$$
$$(w-5)6+(w+3)(-7)=-48$$
$$6w-30-7w-21=-48$$
$$-w-51=-48$$
$$-w=3$$
$$w=-3$$

Now we need to check if – 3 is in the domain of the equation. When we plug-in
The equation -3 makes one of the denominators (w+3), 0, so it’s not in the domain.
Thus the equation has NO SOLUTION.

12) *(4 points)* Simplify

(a) $$\frac{\frac{1}{x}+\frac{1}{y}}{\frac{1}{x^2}+\frac{1}{y^2}}=\frac{\left(\frac{1}{x}+\frac{1}{y}\right)x^2y^2}{\left(\frac{1}{x^2}+\frac{1}{y^2}\right)x^2y^2}=\frac{x^2y^2\frac{1}{x}+x^2y^2\frac{1}{y}}{x^2y^2\frac{1}{x^2}+x^2y^2\frac{1}{y^2}}=\frac{xy^2+x^2y}{y^2+x^2}$$

(b) *(4 points)* $\dfrac{m^{-1}+p^{-2}}{2m^{-2}-p^{-1}}$

$$\frac{m^{-1}+p^{-2}}{2m^{-2}-p^{-1}}=\frac{\frac{1}{m}+\frac{1}{p^2}}{2\cdot\frac{1}{m^2}-\frac{1}{p}}=\frac{m^2p^2\left(\frac{1}{m}+\frac{1}{p^2}\right)}{m^2p^2\left(2\cdot\frac{1}{m^2}-\frac{1}{p}\right)}=\frac{mp^2+m^2}{2p^2-m^2p}$$