Name: _____ Date: _____

PCH – Factoring and Simplifying Expressions You Will Often see in Calculus

Do Now:
Factor completely:

1. $x^4 - 16x^2 - 2x^3 + 32x - 3x^2 + 48$

$x^2(x^2-16) - 2x(x^2-16) - 3(x^2-16)$

$(x^2-2x-3)(x^2-16)$

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

2. $2x^4 - 18x^2 + 5x^3 - 45x + 2x^2 - 18$

$2x^2(x^2-9) + 5x(x^2-9) + 2(x^2-9)$

$(2x^2+5x+2)(x^2-9)$

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

Factor completely and simplify when possible. Express all answers using only positive exponents.

1. $(x+1)\cdot 3(x-3)^2 + (x-3)^3$

$(x-3)^2\left(3(x+1) + x - 3\right)$ (3x+3)

$4x(x-3)^2$

3. $3(x-2)^2(x-6) + (x-2)^3$

$(x-2)^2\left(3(x-6) + x - 2\right)$

$(x-2)^2(4x-20)$

$4(x-2)^2(x-5)$

5. $x^{\frac{1}{2}} \cdot \frac{2}{3}(x-1)^{-\frac{1}{3}} + \frac{1}{2}x^{-\frac{1}{2}}(x-1)^{\frac{2}{3}}$

$2/3x \quad + \frac{1}{2}x^{-\frac{1}{2}}$

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

$$x^{-\frac{1}{2}}(x-1)^{-\frac{1}{3}}\left(\frac{7}{6}x - \frac{1}{2}\right) = \frac{\frac{7}{6}x - \frac{1}{2}}{x^{\frac{1}{2}}(x-1)^{\frac{1}{3}}} = \frac{7x-3}{6x^{\frac{1}{2}}(x-1)^{\frac{1}{3}}}$$

$x > 0,\ x \neq 1$

$$= \frac{7x-3}{6\sqrt{x}\sqrt[3]{x-1}}$$

7. $\dfrac{(x^2+1)2x - (x^2-1)2x}{(x^2+1)^2} = \dfrac{2x(x^2+1-(x^2-1))}{(x^2+1)^2} = \dfrac{2x(2)}{(x^2+1)^2} = \dfrac{4x}{(x^2+1)^2}$

9. $\left(4x^5-1\right)\cdot\frac{1}{3}\left(x+1\right)^{-\frac{2}{3}}+\left(x+1\right)^{\frac{1}{3}}\cdot 20x^4$

$(x+1)^{-2/3}\left(\frac{1}{3}(4x^5-1)+20x^4(x+1)\right)$

$(x+1)^{-2/3}\left(\frac{4}{3}x^5-\frac{1}{3}+20x^5+20x^4\right)$

$(x+1)^{-2/3}\left(\frac{64}{3}x^5+20x^4-\frac{1}{3}\right)$

$$\frac{\frac{64}{3}x^5+20x^4-\frac{1}{3}}{(x+1)^{2/3}}=\frac{64x^5+60x^4-1}{3(x+1)^{2/3}} \qquad x\neq -1$$

Homework 09-12

Name: _____ Date: _____

PCH: Even More Factoring Practice Part II Ms. Loughran

Factor each of the following completely.

1. $3x^3 - x^2y + 6x^2y - 2xy^2 + 3xy^2 - y^3$

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

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

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

4. $x^2 + 2x + 1 - y^2$

$(x+1)^2 - y^2$

$(x+1+y)(x+1-y)$

5. $(4x^2 - 6x)^2 - (4x^2 - 6x) - 2$

$y^2 \quad -y \quad -2$

$(4x^2-6x-2)(4x^2-6x+1)$

$2(2x^2-3x-1)(4x^2-6x+1)$

6. $(x^2 + 2x + 5)^2 - 4(x^2 + 2x + 5) - 5$

$y^2 \quad -4y \quad -5$

$(x^2+2x+5-5)(x^2+2x+5+1)$

$(x^2+2x)(x^2+2x+6)$

$x(x+2)(x^2+2x+6)$

8. $a^2 - b^2 + 12b - 36$

$a^2-(b^2-12b+36)$

$a^2-(b-6)^2$

$(a-(b-6))(a+(b-6))$

$(a-b+6)(a+b-6)$