H.W. 3, 5, 7, 17, 19, 33, 35, 41, 43 ← BARE MINIMUM
Handout Exercise Set 5.7

(3) $3x^2-75 = 3(x^2-25) = 3(x^2-5^2) = \boxed{3(x+5)(x-5)}$ ✓

(4) $4x^2+24x+36 = 4(x^2+6x+9) = 4(x+3)(x+3) = 4(x+3)^2$ ✓

(5) $10s^2+19s-15 = (2s+5)(5s+3)$ ✓

SEE next Page

(6) $-8r^2+30r-18$

$= -2(4r^2-15r+9)$ Now factor $4r^2-15r+9$

$= -2(4r^2-12r-3r+9)$ Need factors of $4(9)=36$

Now factor ↑ But don't forget to put back the -2

Both Factors are Negative

$-1(-36)=36$

$-2(-18)=36$

$-3(-12)=36 \rightarrow -3+(-12)=-15$ ✓

$4r^2-12r-3r+9$

$(4r^2-12r)-(3r-9)$

$4r(r-3)-3(r-3)$

$(r-3)(4-3)$

$\boxed{2(r-3)(4-3)}$ ✓

(7) $6x^3y^2+10x^2y^3+14x^2y^2$

$\boxed{2x^2y^2(3x+5y+7)}$ → Can we factor $3x+5y+7$?

$3(7)=21$ $3+7=10$

$1(21)=21$ $1+21=22$

Thus, the answer is NO!

(5) $10s^2 - 19s - 15$

$10s^2 - 25s + 6s - 15$

$(10s^2 - 25s) + (6s - 15)$

$5s(2s - 5) + 3(2s - 5)$

$= (2s + 5)(5s + 3)$ ✓

$10(-15) = -150$

$1(-150) = -150$

$2(-75) = -150$

$3(-50) = -150$

$5(-30) = -150$

$6(-25) = -150$

$6 + (-25) = -19$

5.7 Handout Cont'd

(8) $24m^3n - 12m^2n^2 + 16mn^3$ LCD $= 4mn$

$= 4mn(m^2 - 3mn + 4n^2)$ Prime

$(m-2n)(m-2n)$ NO

$(m-1n)(m-4n)$ NO

No other ways to get $-3mn$ for middle term

(5.7) Problems

$m^2 - 3mn + 4n^2$ Prime

(9) $0.8x^2 = 0.072$

$= .8(x^2 - .09)$

$= .8(x^2 - .3^2) = \boxed{.8(x+0.3)(x-0.3)}$

$.8 \overline{).072}$ → 09

(10) $0.5x^2 = 0.32$

$= 0.5(x^2 - 0.64)$

$= 0.5(x^2 - 0.8^2)$

$= \boxed{0.5(x+0.8)(x-0.8)}$

$.5 \overline{).320}$ → $.64$

30

20

20

0

(11) $6x^5 - 54x = 6x(x^4 - 9) = 6x([x^2]^2 - 3^2)$

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

(12) $7x^2y^2z^2 - 28x^2y^2$ GCF $= 7x^2y^2$

$= 7x^2y^2(z^2 - 4) = \boxed{7x^2y^2(z+2)(z-2)}$

(13) $3x^6 - 3x^5 + 12x^5 - 12x^4$

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

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

(5.7) Problems

(14) $2x^2y^2+6xy^2-10xy^2-30y^2$

$= 2y^2(x^2+3x-5x-15)$

$= 2y^2(x^2-2x-15) = \boxed{2y^2(x-5)(x+3)}$ ✓

(15) $5x^4y^2+20x^3y^2+15x^3y^2+60x^2y^2$ GCF $= 5x^2y^2$

$= 5x^2y^2(x^2+4x+3x+12)$

$= 5x^2y^2(x^2+7x+12) = \boxed{5x^2y^2(x+4)(x+3)}$ ✓

(16) $6x^2-15x-9$

$= 3(2x^2-5x-3)$

$2(-3) = -6$

$1(-6) = -6 \quad 1+(-6) = -5$

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

$= 3[(2x^2-6x)+(x-3)]$

$= 3[2x(x-3)+1(x-3)]$

$= 3[(x-3)(2x+1)] = \boxed{3(x-3)(2x+1)}$ ✓

5.7 Problems

(17) $x^4 - x^2y^2 = x^2(x^2 - y^2) = \boxed{x^2(x+y)(x-y)}$

(18) $4x^3 + 108 = 4(x^3 + 27) = 4(x^3 + 3^3)$

sum of cubes

$= \boxed{4(a+b)(a^2 - ab + b^2)}$ template

$= \boxed{4(x+3)(x^2 - 3x + 9)}$

(19) $x^7y^2 - x^4y^2 = x^4y^2(x^3 - 1)$

$= x^4y^2(x^3 - 1^3)$

$= x^4y^2(a-b)(a^2 + ab + b^2)$ template

$= x^4y^2(x-1)(x^2 + x \cdot 1 + 1^2)$

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

(20) $x^4 - 81 = (x^2)^2 - 9^2 = (x^2+9)(x^2-9)$

$= \boxed{(x^2+9)(x+3)(x-3)}$

(21) $x^5 - 16x = x(x^4 - 16) = x([x^2]^2 - 4^2)$

$= x[(x^2+4)(x^2-4)]$

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

5.7 Problems

22) $20x^2y^2 + 55xy^2 - 15y^2$

$= 5y^2(4x^2 + 11x - 3)$

$= 5y^2[4x^2 - 1x + 12x - 3]$

$= 5y^2[(4x^2 - x) + (12x - 3)]$

$= 5y^2[x(4x-1) + 3(4x-1)]$

$= 5y^2[(4x-1)(x+3)] = \boxed{5y^2(4x-1)(x+3)}$

$4(-3) = -12$

$-1(12) = -12$

$-1 + 12 = 11$

23) $4x^6 + 32y^3 = 4(x^6 + 8y^3)$

Sum of Cubes

$= 4([x^2]^3 + [2y]^3)$

$= 4(a+b)(a^2 - ab + b^2)$

$= 4(x^2 + 2y)([x^2]^2 - x^2 \cdot 2y + (2y)^2)$

$= \boxed{4(x^2 + 2y)(x^4 - 2x^2y + 4y^2)}$

(5.7) Problems

(24) $8x^4 - 4x^3 - 4x^3 + 2x^2$

$= 8x^4 - 8x^3 + 2x^2$

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

$= 2x^2([2x]^2 - 4x + 1^2)$

$2(2x)(1) = 4x$

$4(1) = 4$

$-1(-4) = 4 \quad -1 + (-4) = -5$

$-2(-2) = 4 \quad -2 + (-2) = -4$ ✓

But we also have a perfect Square

$\rightarrow \boxed{2x^2(2x-1)^2}$ ✓

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(29) $5(a+b)^2 - 20$ ← a difference of Squares

$5[(a+b)^2 - 4]$

$5[(a+b)^2 - 2^2]$

$5[(a+b+2)(a+b-2)]$

OR

$\boxed{5(a+b+2)(a+b-2)}$ ✓

(26) $12x^3y^2 + 4x^3y^2 - 40xy^2$

GCF $= 4xy^2$

$4xy^2(3x^2 + x - 10)$

$3(-10) = -30$

$-5(6) = -30$

$-5 + 6 = 1$

$4xy^2(3x^2 - 5x + 6x - 10)$

$4xy^2[(3x^2 - 5x) + (6x - 10)]$

$4xy^2[x(3x - 5) + 2(3x - 5)]$

$4xy^2[(3x - 5)(x + 2)]$

or $\boxed{4xy^2(3x - 5)(x + 2)}$

(27) $6x^2 + 36xy + 54y^2$

$6(x^2 + 6xy + 9y^2)$

factors of 9 that add up to 6

$3(3) = 9$

$3 + 3 = 6$

$6(x + 3y)(x + 3y)$

$6(x + 3y)^2$

or notice it's a perfect square

$x^2 + 6xy + (3y)^2$

$2(x)(3y) = 6xy$

so $(x + 3y)^2$ or $(x + 3y)(x + 3y)$

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Starting here Doing Only Odd Problems

(29) $(x+2)^2 - 4$

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

$[(x+2)+2][(x+2)-2]$

$(x+2+2)(x+2-2)$

$(x+4)\cdot x$ or $x(x+4)$

(31) $6x^2+24xy-3xy-12y^2$

$(6x^2+24xy)-(3xy+12y^2)$

$6x(x+4y)-3y(x+4y)$

$(x+4y)(6x-3y)$

But I forgot to factor out the GCF. So,

$(x+4y)(3)(2x-y)$

or $3(x+4y)(2x-y)$

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Substitution Problem

$(y+5)^2+4(y+5)+4$

Let $u=y+5$

u^2+4u+4

$(u+2)(u+2)$ or $(u+2)^2$

But $u=y+5$

So, $\boxed{(y+5+2)(y+5+2)}$

$\boxed{(y+7)(y+7)}$ or $(y+7)^2$

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35 b^4+2b^2+1

$(b^2)^2+2b^2+1$ Let $u=b^2$

u^2+2u+1

$(u+1)(u+1)$ or $(u+1)^2$

But $u=b^2 \longrightarrow \boxed{(b^2+1)^2}$

(37) $x^3+\frac{1}{64}$ Sum of Cubes

$x^3+\left(\frac{1}{4}\right)^3$ sum of cubes

$a=x$; $b=\frac{1}{4}$

Template $(a+b)(a^2-ab+b^2)$

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

$\boxed{\left(x+\frac{1}{4}\right)\left(x^2-\frac{1}{4}x+\frac{1}{16}\right)}$ ✓

(39) $6y^3+14y^2+4y$ GCF $=2y$

$2y(3y^2+7y+2)$

$3(2)=6$

$1(6)=6$ $1+6=7$

$2y(3y^2+y+6y+2)$

$2y[(3y^2+y)+(6y+2)]$

$2y[y(3y+1)+2(3y+1)]$

$2y[(3y+1)(y+2)]$

or

$\boxed{2y(3y+1)(y+2)}$ ✓

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(41) $a^3b - 81ab^3$ GCF = ab

$ab(a^2 - 81b^2)$

$ab(a^2 - [9b]^2)$

$ab(a+9b)(a-9b)$ ✓

(43) $49 - (x^2 + 2xy + y^2)$ a perfect square, $2 \cdot x \cdot y$

$49 - (x+y)^2$

$7^2 - (x+y)^2$

$[7 + (x+y)][7 - (x+y)]$

$(7+x+y)(7-x-y)$

(45) $24x^2 - 34x + 12$ GCF = 2

$2(12x^2 - 17x + 6)$

$12(6) = 72$

Both factors negative

$-8(-9) = 72$

$-8 + (-9) = -17$

$2(12x^2 - 8x - 9x + 6)$

$2[(12x^2 - 8x) - (9x - 6)]$

$2[4x(3x-2) - 3(3x-2)]$

$2[(3x-2)(4x-3)]$

$2(3x-2)(4x-3)$ ✓

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$18x^2+39x-15$

$3(6x^2+13x-5)$

$3(6x^2-2x+15x-5)$

$3[(6x^2-2x)+(15x-5)]$

$3[2x(3x-1)+5(3x-1)]$

$3[(3x-1)(2x+5)]$

$3(3x-1)(2x+5)$

$6(-5)=-30$

$-2(15)=-30$

$-2+15=13$