Math 116 Notes 9/22/2021

questions from co-req 3

q1

Simplify.

$$(-u^2+5u-6)+(4u^2+2u+7)$$

combine like terms, like terms have the same variable part , we're only, so drop parenthesis

$-u^2+5u-6+4u^2+2u+7$

regroup: $-1u^2+4u^2+5u+2u-6+7$

combine: $(-1+4)u^2+(5+2)u+1$

simplify: $\boxed{3u^2+7u+1}$ answer

fast way: add up like terms mentally

Rewrite without parentheses.

$$-5w^6(2w^3+6w^2-7w)$$

Simplify your answer as much as possible.

within parenthesis no like terms b/c w^3 ,w^2 and w are all different.

multiply $-5w^6$ to each term inside parenthesis

distributes $-5w^6$: $-5w^6\cdot 2w^3-5w^6\cdot 6w^2-5w^6\cdot(-7w)$

regroups: $-5\cdot 2w^6w^3-5\cdot 6w^6w^2-5(-7)w^6w$

$\boxed{-10w^9-30w^8+35w^7}$ answer

notice parenthesis are gone

no like terms are present b/c w^9 ,w^8 ,w^7 are all different

Multiply.

$$(w+2)(w-4)$$

Simplify your answer.

$(x+a)$ is called a binomial b/c it has two terms

terms are expressions combined through addition or subtraction

$(w+2)(w-4)$

first distribute (w-4) : $w(w-4)+2(w-4)$

distribute w, 2: $w\cdot w-4\cdot w+2\cdot w+2(-4)$

multiply: $w^2-4w+2w-8$

combine middle terms: $\boxed{w^2-2w-8}$

Usually we use FOIL b/c it's faster.

F= product of first terms: $(\boxed{x}+a)(\boxed{x}-b):x\cdot x=x^2$

O= product of outer terms: $(\boxed{x}+a)(x-\boxed{b}):-bx$

I= product of inner terms: (x+a)(x-b): ax

L= product of last terms: $(x+\boxed{a})(x-\boxed{b})=-ab$

$(x+a)\cdot(x-b)=x^2-bx+ax-ab$

$(w+2)(w-4)$ = FOIL=$w^2-4w+2w-8$

$=\boxed{w^2-2w-8}$ same as above

Multiply.

$$(3y-1)(7y+3)$$

Simplify your answer.

product of two binomials so FOIL applies

$(3y-1)(7y+3)\rightarrow$ FOIL

$=3y\cdot 7y+3y(3)+(-1)(7y)+(-1)(3)$

$\rightarrow$ multiply out

$=21y^2+9y-7y-3$

$\rightarrow$ combine middle terms b/c y is same trinomial

$=\boxed{21y^2+2y-3}$ answer

Multiply.

$$(4x-5y)(x+7y)$$

Simplify your answer.

product of two binomials,so use FOIL to multiply out

note : xy=yx

$2\cdot 3=3\cdot 2=6$

FOIL: $4x\cdot x+4x(7y)-5y(x)-5y(7y)$

multiply out: $4x^2+28xy-5xy-35y^2$

combine middle terms : $\boxed{4x^2+23xy-35y^2}$ answer

b/c each one has xy

Multiply.

$$(u-3)(u+3)$$

Simplify your answer.

product of two binomials,so FOIL applies

(u-3) is one binomial,

(u+3) is the other binomial

$(u-3)(u+3)\rightarrow$ FOIL $\rightarrow u^2+3u-3u-3(3)$

$\rightarrow$ multiply $\rightarrow u^2+3u-3u-9$

cancell 3u and -3u: $\boxed{u^2-9}$ answer

here , we have a binomial as the product b/c the middle terms cancel each other

Multiply.

$$(5z+2y)(5z-2y)$$

Simplify your answer.

1 notice 2y and -2y are the same except for the sign
so middle terms will cancel
2. product of two binomials so FOIL applies
3. binomial 1=5z+2y, binomial 2=5z-2y
now FOIL out:
$(5z+2y)(5z-2y)$ note: $2y(5z)=2\cdot5\cdot y\cdot z=10yz=10zy$
$=5z\cdot5z+5z(-2y)+2y(5z)+2y(-2y)$

$F \quad O \quad I \quad L$

$=25z^2-10zy+10zy-4y^2$

$=25z^2-4y^2$ answer

notice answer is a binomial b/c middle terms cancel

Factor.

$$3w+15$$

factoring: $6=2\cdot3$
factor means write as a product
$2x=2\cdot x$ product
$10x=2\cdot5\cdot x$ product
$4w^2=2\cdot2w\cdot w$ product
$2(x-3)=$ distribute $2=2x-6$
imagine we want to reverse
the distributve property
$4w+8=4\cdot w+4\cdot2$
put 4 outside
$=4(w+2)$
$=4(w+2)$ answer

$3w+15=3\cdot w+5\cdot3$
$=3(w+5)$ answer
notice it shows 3 times (w+5)

Notes should have the following: (and so on for each week)
week 1: objective 1 notes, co-req 1 notes , tutoring 1
week 2: objective 2 notes, co-req 2 notes , tutoring 2
week 3: objective 3 notes, co-req 3 notes , tutoring 3

q11

Find the greatest common factor of $11m^4$ and $5m^2$.

factor $11m^4=11\cdot m\cdot m\cdot m\cdot m$
factor $5m^2=5\cdot m\cdot m$
} based on these, the GC F=$m\cdot m=m^2$

Find the greatest common factor of $15n^3$ and $10n^4$.

factor $15n^3=3\cdot5\cdot n\cdot n\cdot n$
factor $10n^4=2\cdot5\cdot n\cdot n\cdot n\cdot n$

now highlight common pieces
GCF=$5\cdot n\cdot n\cdot n=5n^3$ *answer*
take each matched factor once only

q12

Factor $15y^2-12y^3$.

identify the GCF
$3\cdot5\cdot y\cdot y-4\cdot3\cdot y\cdot y\cdot y$ factor each
put these outside parenthesis
$3yy(5-4y)$
5-4y is not in the red boxes
$3y^2(5-4y)$ answer
notice it's $3y^2$ times (5-4y)

Factor $6c^2+4c$.

check: $2c(3c+2)=6c^2+4c$ same as original
(factoring: $2c(3c+2)=6c^2+4c$; distribution)

$2\cdot3\cdot c\cdot c+2\cdot2\cdot c$ factor each expression first

so the GCF is 2c
$6c^2+4c=2\cdot3\cdot c\cdot c+2\cdot2\cdot c=3c(2c)+2(2c)=2c(3c+2)$ answer

Factoring is the reverse of the distributive property. Or the distributive property is the reverse of factoring.

$x^2+x+2x+2$ given this has 4 terms

factor this into (x+a)(x+b) expression of this form
product of two binomials
$(x^2+x)+(2x+2)$ what's the GCF of $x^2+x\cdot1$? it's x , so we get $x\cdot x$
$(x\cdot x+x\cdot1)+(2\cdot x+2\cdot1)$
$x(x+1)+2(x+1)$

$(x+1)(x+2)$ or $(x+2)(x+1)$ either one is the answer

example 2: $4x^2+4x+8x+8$

$(4x^2+4x)+(8x+8)$ group $4x^2+4x$, group $8x+8$ b/c they have common factors

$(4\cdot x\cdot x+4x\cdot 1)+(8\cdot x+8\cdot 1)$ factor each term inside each parenthesis

$4x(x+1)+8(x+1)$ pull 4x out , pull 8 out

$(4x+8)(x+1)$ notice $4x+8$ have a common factor of 4

$(4\cdot x+4\cdot 2)(x+1)$ write $4x$ as $4\cdot x$, 8 as $4\cdot 2$

$4(x+2)(x+1)$ answer

since 4 is common, outside parenthesis
x+2 no common factors, x+1 no common factors, so stop

Factor by grouping.

$5x^3+4x^2+25x+20$ $=(5x^3+4x^2)+(25x+20)$ grouped

$=(5\cdot x\cdot x\cdot x+2\cdot 2\cdot x\cdot x)+(5\cdot 5x+5\cdot 4)$

$=(5x\cdot x^2+4\cdot x^2)+(5\cdot 5x+5\cdot 4)$

$=x^2(5x+4)+5(5x+4)$ pull x^2 out, pull 5 out

$=(x^2+5)(5x+4)$ the answer

pull (5x+4) out

notice x^2+5 no common factor left
5x+4 no common factor left
so stop

Factor by grouping.

$4y^3+7y^2+20y+35$ $=(4y^3+7y^2)+(20y+35)$ group

4,7 no common factor

$=(4\cdot y\cdot y\cdot y+7yy)+(5\cdot 4y+5\cdot 7)$

$=(4y\cdot y^2+7y^2)+(5\cdot 4y+5\cdot 7)$ regrouped yyy as $y\cdot y^2$

$=y^2(4y+7)+5(4y+7)$ pull y^2 out, pull 5 out

$=(y^2+5)(4y+7)$ answer pull (4y+7) out

separate example: (in case you have trouble understanding how to factor a binomial out)
$y(x+5)+6(x+5)$, set a=x+5 b/c it's the same in both terms
ya+6a now we have an expression with a only, might be easier to see how to pull a out
$(y+6)a$ pull a out

remember a=x+5, so replace back a back with (x+5): $(y+6)(x+5)$ answer