Math 115

Fall 2017

Lecture 21

Class Quiz

1) Find $(2x+3)^2$

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

$= \boxed{4x^2+12x+9}$

2) Divide: $\dfrac{12x^4 - 6x^2}{3x^2}$

$= \dfrac{12x^4}{3x^2} - \dfrac{6x^2}{3x^2}$

$= \boxed{4x^2-2}$

3) Divide: $\dfrac{x^2-6x+5}{x-2}$

$x \square = x^2$

$x \square = -4x$

$$\begin{array}{r} x\ -4 \\ x-2\ \overline{)\ x^2-6x+5} \\ -(x^2-2x\ \ \ ) \\ \hline -4x+5 \\ -(-4x+8) \\ \hline -3 \end{array}$$

$$\boxed{x-4+\frac{-3}{x-2}}$$

Factor out the GCF

1) $4x^2 - 16x$

$= \boxed{4x(x-4)}$

2) $10x^3 - 20x^2 + 50x$

$= \boxed{10x(x^2 - 2x + 5)}$

3) $3x(7x+2) - 5(7x+2)$

$= \boxed{(7x+2)(3x-5)}$

4) $x^2(2x-5) - 3x(2x-5) - 8(2x-5)$

$= \boxed{(2x-5)(x^2 - 3x - 8)}$

Factor by grouping:

5) $5x^3 + 3x^2 + 10x + 6$

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

6) $7x^3 - 2x^2 + 70x - 20$

$= x^2(7x-2) + 10(7x-2) = \boxed{(7x-2)(x^2+10)}$

7) $12x^3 + 15x^2 - 4x - 5$

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

Factor

1) $x^2 + 4x + 3$

1, 3 | 3 | P = 3, S = 4

$= x^2 + x + 3x + 3$

$= x(x+1) + 3(x+1)$

$= \boxed{(x+1)(x+3)}$

2) $x^2 - 2x - 24$

$-6, 4$ | -24 | P = −24, S = −2

$= x^2 - 6x + 4x - 24$

$= x(x-6) + 4(x-6)$

$= \boxed{(x-6)(x+4)}$

3) $x^2 - 8x + 15$

$-5, -3$ | 15 | P = 15, S = −8

$= x^2 - 5x - 3x + 15$

$= x(x-5) - 3(x-5) = \boxed{(x-5)(x-3)}$

$\boxed{(x-10)^2}$

4) $x^2 - 20x + 100$

$-10, -10$ | 100 | P = 100, S = −20

$= x^2 - 10x - 10x + 100$

$= x(x-10) - 10(x-10)$

Factor Completely:

1) $2x^2 + 7x - 15$

$-3, 10$ ✓ | -30 | P = −30, S = 7

$= 2x^2 - 3x + 10x - 15$

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

$= \boxed{(2x-3)(x+5)}$

2) $6x^2 - 5x - 6$

$4, -9$ ✓ | -36 | P = −36, S = −5

$= 6x^2 + 4x - 9x - 6$

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

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

Factor Completely:

1) $10x^2 + 23x + 12$

8 & 15 | 120 | P = 120, S = 23

$= 10x^2 + 8x + 15x + 12$

$= 2x(5x+4) + 3(5x+4)$

$= \boxed{(5x+4)(2x+3)}$

2) $6x^2 - 23x + 20$

-15 & -8 | 120 | P = 120, S = -23

$= 6x^2 - 15x - 8x + 20$

$= 3x(2x-5) - 4(2x-5)$

$= \boxed{(2x-5)(3x-4)}$

Use A^2+B^2, A^2-B^2, A^3+B^3, and A^3-B^3 to factor

1) $36x^2 - 49$

$= (6x)^2 - (7)^2$

$A^2 - B^2$

$= \boxed{(6x+7)(6x-7)}$

2) $25x^2 + 36$

$= (5x)^2 + (6)^2$

$A^2 + B^2$ **Prime**

3) $125x^3 + 8$

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

$A^3 + B^3$

$= \boxed{(5x+2)(25x^2 - 10x + 4)}$

4) $27x^3 - 64$

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

$A^3 - B^3$

$= \boxed{(3x-4)(9x^2 + 12x + 16)}$

Use $A^2+2AB+B^2=(A+B)^2$ or $A^2-2AB+B^2=(A-B)^2$ to factor

1) $121x^2-44x+4=(11x-2)^2$

$2\cdot 11x\cdot 2$ ✓

2) $49x^2+168xy+144y^2=(7x+12y)^2$

$2\cdot 7x\cdot 12y$ ✓

Factor Completely:

1) $20x^3y^2-15x^2y^3$

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

2) $2x^2-200$

$=2(x^2-100)$

$=2(x^2-10^2)$

A^2-B^2

$=\boxed{2(x+10)(x-10)}$

3) $75x^2-27y^2$

$=3(25x^2-9y^2)$

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

$=\boxed{3(5x+3y)(5x-3y)}$

4) x^2-3x+9

1, 9

3, 3

$P=9$

$S=-3$

Prime

5) $x^2 - 16 + 6x$

$= x^2 + 6x - 16$

$= \boxed{(x+8)(x-2)}$

1, 72
2, 36
3, 24
⋮
8, 9

6) $12x^2 + 34x + 24$

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

$P = 72$, $S = 17$, 72

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

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

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

7) $12x^3 - 24x^2 + 4x$

$= \boxed{4x(3x^2 - 6x + 1)}$

8) $4x^3 + 20x^2 - 56x$

$= 4x(x^2 + 5x - 14) = \boxed{4x(x+7)(x-2)}$

9) $2x - 5 + 3x^2$

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

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

$+5x$

$-3x$

10) $x^3 + 7x^2 - 4x - 28$

$= x^2(x+7) - 4(x+7)$

$= (x+7)(x^2 - 4)$

$A^2 - B^2$

$= \boxed{(x+7)(x+2)(x-2)}$

11) $3x^2 - 5x + 1$

1, 3 — 3 — $P=3$, $S=-5$

Prime

12) $x^2y^2 - 9x^2 + 3y^2 - 27$

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

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

$A^2 - B^2$

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

13) $27x^4y - 125xy^4$

Hint: GCF, $A^3 - B^3$

$= xy\left[27x^3 - 125y^3\right]$

$= xy\left[(3x)^3 - (5y)^3\right]$

$= xy(3x-5y)(9x^2 + 15xy + 25y^2)$

14) $5x^4 - 115x^3 + 600x^2$ Hint: GCF

$= 5x^2(x^2 - 23x + 120)$

$= \boxed{5x^2(x - 15)(x - 8)}$