

Mathe Seminare 12

① $(a^2 - b^3)^5$

$$\begin{array}{ccccccc} & & & & 1 & & \\ & & & & 1 & 1 & \\ & & & 1 & 2 & 1 & \\ & & 1 & 3 & 3 & 1 & \\ & 1 & 4 & 6 & 4 & 1 & \\ 1 & 5 & 10 & 10 & 5 & 1 & \end{array}$$

$$\textcircled{1} (a^2)^5 - 5(a^2)^4(b^3)^1 + 10(a^2)^3(b^3)^2 - 10(a^2)^2(b^3)^3 + 5(a^2)(b^3)^4 - 1(b^3)^5$$

$$7(a^{15}) - 5(a^8)(b^3) + 10(a^6)(b^6) - 10(a^4)(b^9) + 5(a^2)(b^{12}) - 1(b^{15}) =$$

$$7a^{15} - 5a^8b^3 - 10a^6b^6 - 10a^4b^9 + 5a^2b^{12} - 1(b^{15})$$

② $(m^3 + 2n^4)^7$

$$\begin{array}{ccccccc} & & & & 1 & & \\ & & & & 1 & 1 & \\ & & & 1 & 2 & 1 & \\ & & 1 & 3 & 3 & 1 & \\ & 1 & 4 & 6 & 4 & 1 & \\ 1 & 5 & 10 & 10 & 5 & 1 & \\ 1 & 6 & 15 & 20 & 6 & 1 & \\ 1 & 7 & 21 & 35 & 35 & 21 & 1 \end{array}$$

$$7(m^3)^7 + 7(m^3)^6(2n^4)^1 + 21(m^3)^5(2n^4)^2 + 35(m^3)^4(2n^4)^3 + 35(m^3)^3(2n^4)^4 + 21(2n^4)(m^3)^2(2n^4)^5 + 7(m^3)(2n^4)^6 + 7(2n^4)^7$$

$$7(m^3)^7 + 7(m^3)^6(2n^4)^1 + 21(m^3)^5(2n^4)^2 + 35(m^3)^4(2n^4)^3 + 35(m^3)^3(2n^4)^4 + 21(m^3)^2(2n^4)^5 + 7(m^3)(2n^4)^6 + 7(2n^4)^7$$

$$(70)^5 + 14(15)^4 + 42m^5n^4 + 70m^2n^7 + 70m^9n^6 + 42n^6 + 74m^3n^4 + 2n^25$$

③

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

$$\begin{array}{ccccccc} & & & & 7 & & \\ & & & & 7 & 7 & \\ & & & 1 & 2 & 7 & \\ & & 1 & 3 & 3 & 1 & \\ 7 & 4 & 6 & 4 & 7 & & \end{array}$$

$$7(3x)^4 - 4(3x)^3(2y) + 6(3x)^2(2y)^2 - 4(3x)(2y)^3 + 7(2y)^4$$

$$7(3x)^4 - 4(3x)^3(2y) + 6(3x)^2(2y)^2 - 4(3x)(2y)^3 + 7(2y)^4$$

$$3x - 24x^3y + 36x^2y^2 - 84xy^3 + 2y^4$$

④ $(5m - 2n)^5$

$$\begin{array}{ccccccc} & & & & 1 & & \\ & & & & 7 & 1 & \\ & & & 1 & 2 & 7 & \\ & & 1 & 3 & 3 & 1 & \\ & 7 & 4 & 6 & 4 & 7 & \\ 1 & 5 & 10 & 10 & 5 & 1 & \end{array}$$

$$1(5m)^5 - 5(5m)^4(2n) + 10(5m)^3(2n)^2 - 10(5m)^2(2n)^3 + 5(5m)(2n)^4 - 1(2n)^5$$

$$5m - 5m^4n + 100m^3n^2 - 700m^2n^3 + 50mn^4 - 2n^5$$

$$\textcircled{5} (2x^3 - 3y^2)^6$$

$$\begin{array}{ccccccc} & & & & & & 1 \\ & & & & & 1 & 1 \\ & & & 1 & 2 & 1 & \\ & & 1 & 3 & 3 & 1 & \\ & 1 & 4 & 6 & 4 & 1 & \\ 1 & 5 & 10 & 10 & 5 & 1 & \\ 7 & 6 & 15 & 20 & 15 & 7 & \end{array}$$

$$1(2x^3)^6 - 6(2x^3)^5(3y^2) + 15(2x^3)^4(3y^2)^2 - 20(2x^3)^3(3y^2)^3 + 15(2x^3)^2(3y^2)^4 - 6(2x^3)(3y^2)^5 + 1(3y^2)^6$$

$$1(2x^6) - 6(2x^5)(3y^2) + 15(2x^4)(3y^2)^2 - 20(2x^3)(3y^2)^3 + 15(2x^2)(3y^2)^4 - 6(2x)(3y^2)^5 + 7(3y^2)^6$$

$$2x^6 - 36x^5y^2 + 90x^4y^4 - 120x^3y^6 + 90x^2y^8 - 36xy^{10} + 3y^{12}$$