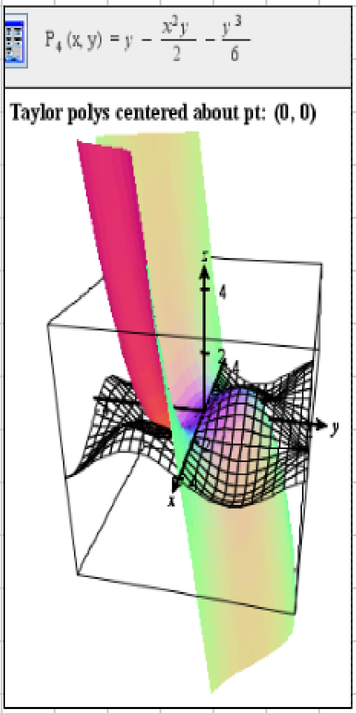
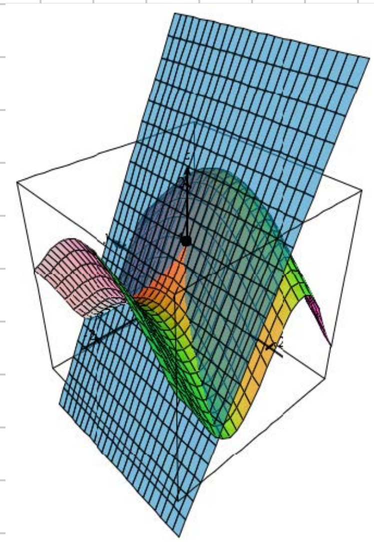
Math 10 Chp 5.1

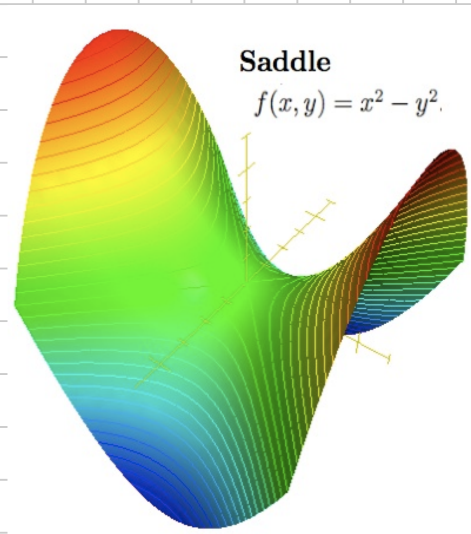
Note Title 2016-07-18

Multiplying Polynomials

What are polynomials used for? They are used to represent real-life problems that we want to solve, such as science, business, and computer animation.







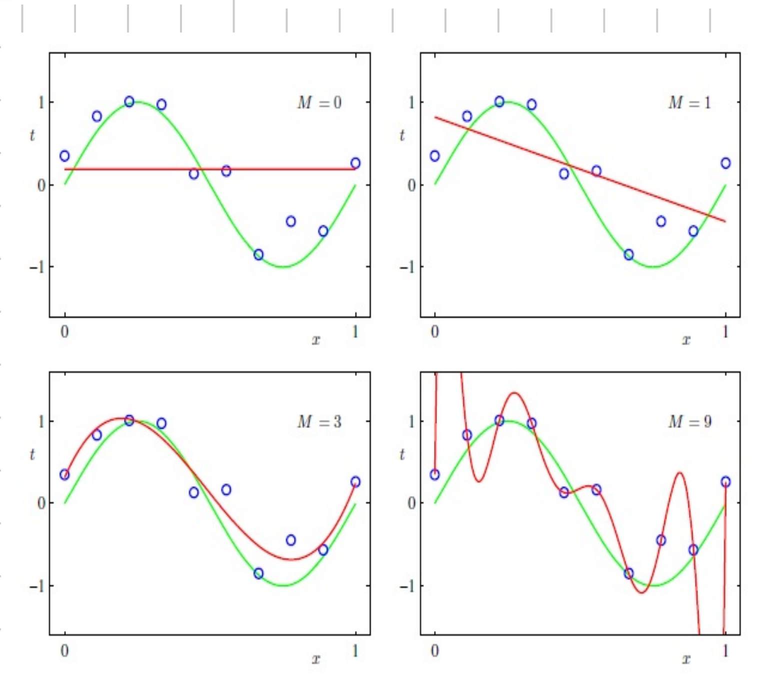


Figure 1.4 Plots of polynomials having various orders M, shown as red curves, fitted to the data set shown in Figure 1.2.

Polynomials can get fancy, but we will start with simpler ones!

Polynomials is a combo of poly & nomial. Poly means many. Nomial means name, but in math it means term. So polynomial means many terms. Terms consist of factors and terms are separated by plus or minus.

eg) $x^2 + 3$, $x^3 - y^2$, $2x^2$, $3x^2 + 4x + 8$

To multiply polynomials, we will use the distributive property. This means we multiply every term in the first polynomial with every term in the second polynomial. When multiplying a binomial with a binomial, we have a special name FOIL

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

eg) $(4y-5)(-3y+6) =$

The number of terms to multiply is the number of terms in each polynomial multiplied together.

eg) (Trinomial)(Trinomial) needs 9 terms

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

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

Applications

eg) Create a polynomial for the area of a picture frame. The poster is 24 cm x 16 cm. We want to add a matte that is y cm wide on each side.

eg) Create a polynomial for revenue. The donut shop sells 3000 donuts per day at 55¢ per donut. For each 1¢ increase in price, they lose 30 donuts.

eg) Create a polynomial for the inquiry. Let x represent the leading digits. Use 5 as the last digit. Expand. Factor the x terms.

Assigned Work: pp. 209 - 213: 3 ace, 4 ace, 6 ac, 10, 13

Challenge: 11, 14, 17

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Common Factors - As I have mentioned, we do 3 things with many math problems: algebra, substitution and factoring. We do factoring to help us find the GCF (greatest common factor) and the LCM (lowest common multiple. We can factor using prime factorization, factor trees, or other methods.

Review: Find the GCF and LCM of 60 and 72.

60 72

GCF of Polynomials - it's actually easier than doing numbers. Use the smallest power of each monomial.

eg) Find the GCF of $48a^3b^2 + 36a^2b^5 - 18a^5b^4$ and write in factored form

Factoring Polynomials into binomials - it's all about seeing patterns.

eg) $6(5+7)-2(5+7)$

eg) $6x(3a-b)-7y(3a-b)$

eg) $5x(4x+5y)+3y(4x+5y)$

Next step: See patterns

eg) $5x^2y+10x-3xy-6$

eg) $3x^3+3xy+5x^2+5y$

eg) $12x^2-9xy+28xy-21y^2$

Applications

eg) The area of a fishing net is given as $20x^2+35x$. The size can be determined by factoring. Determine a possible size.

eg) The area of a trapezoid is $\frac{b_1 h + b_2 h}{2}$.

Write this in factored form

Assigned Work: pp. 220 - 223: 2ace, 3ace, 4ace, 5ac, 7ac, 8, 11, 13

Challenge: 14, 16, 17

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Factoring Trinomials – this is an important skill that you will continue to use even in university calculus. It is important to become proficient to learn advanced concepts more easily!

Factoring in the form $x^2 + bx + c$ – we must find factor pairs of c that sum to b.

eg) Factor $x^2 + 9x + 14$

eg) Factor $x^2 - 6x + 8$

eg) Factor $x^2 + x - 12$

Product, Factor, Sum Method for $ax^2 + bx + c$

eg) $5x^2 - 27x - 18$

eg) $4x^2 + 23x + 15$

eg) $x^2 + 6xy + 8y^2$

Other Problems

eg) Find all values of n that makes $x^2 + nx + 12$ factorable.

eg) Find 4 values of n that makes $x^2 + 4x + n$ factorable.

eg) The height of a football in metres is determined by $-4.9t^2 + 6t + 2$. What is the ball's height after 1.1 seconds?

Assigned Work: pp. 234 - 237: 4 ace, 5 ace, 6 ac, 8, 9 ac, 10 ac, 15

Challenge: 16, 19, 20

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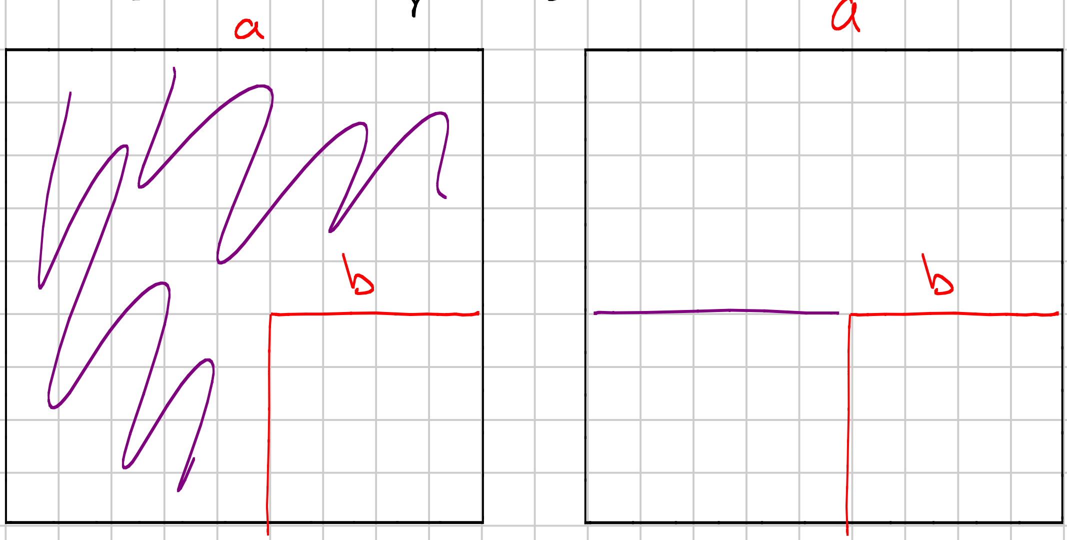
Factoring Special Trinomials - recognizing certain patterns allows you to factor more quickly. Regular methods will still work but will take more time.

Difference of Squares



Note: it doesn't matter if a^2 or b^2 is a perfect square, just use the formula.

eg) Factor $49x^2 - 16y^2 =$

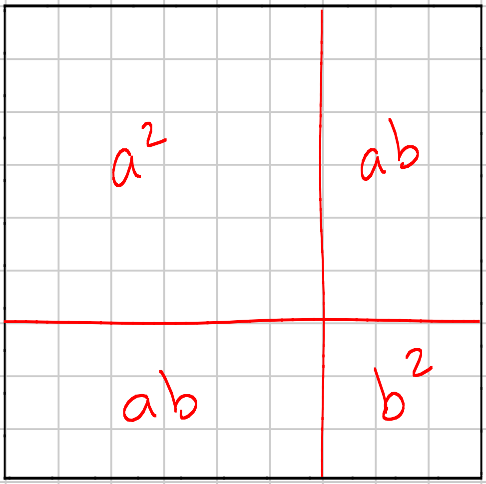
eg) Factor $5d^2 - 7e^2 =$

eg) Factor $25x^2 - 81y^2 =$

eg) Factor $4m^2 - n^2 =$

eg) Factor $3m^2 - 11n^2 =$

Geometric Proof of $a^2 + 2ab + b^2 = (a+b)^2$



For this a^2 & b^2 are normally perfect squares. We then check the middle term matches 2ab. If not then it must be factored differently.

eg) Factor $4x^2 + 12xy + 9y^2$

eg) Factor $4x^2 - 12xy + 9y^2$

eg) Factor $36x^2 + 108x + 81$

eg) Factor $4x^2 + 25x + 36$

Is $a^2 - b^2$ or $a^2 + 2ab + b^2$ easier to factor?

Mathemagics!

Mental Math: $(41)(39) =$

$(33)(27) =$

$(37)(23) =$

Create your own example and solve!

Assigned Work: pp. 246-251: 2ab, 3ab, 5ace, 6ace, 8ac, 11

Challenge: 14, 18, 21, 23