Ideas for Project Topics
MA 330

Below is a list of ideas for project topics. You are *not* restricted to completing a project from this list, these are only suggestions for topics. For each of these mathematical topics, I have listed a person who was heavily involved in that topic who might be of interest for biographical reasons, along with the area of mathematics that it falls into. Not all of these topics are appropriate for all students; an appropriate choice of project topic depends on your mathematical background.

(1) Stirling's Formula: Stirling (calculus, advanced calculus)
(2) Irrationality of π: various mathematicians (calculus)
(3) Differential Geometry: Gauss (geometry)
(4) Classical Partition Identities: Euler, Ramanujan, MacMahon (combinatorics, number theory)
(5) Noether Isomorphism Theorems: Emmy Noether (modern algebra)
(6) Fourier Series: Fourier (calculus, mathematical physics, advanced calculus)
(7) Infinite Series: Archimedes, Newton, Maclaurin, Taylor (calculus)
(8) Partial Differential Equations (wave equation, heat equation): d'Alembert (calculus)
(9) Four and Five Color Theorems: Kempe, Heawood (combinatorics)
(10) Cayley's Tree Theorem: Cayley, Plücker (combinatorics)
(11) Catalan Numbers: Catalan (combinatorics)
(12) Transcendental nature of e: Hermite (analysis)
(13) Pell's Equation: Diophantus, Lagrange (number theory)
(14) Euler's totient function and encryption schemes: various mathematicians (number theory)
(15) Least squares methods and linear regression: Gauss (linear algebra)
(16) Magic Squares: Stanley, MacMahon, many others (combinatorics, recreational mathematics)
(17) Classification of Plane Symmetry Groups: Da Vinci (abstract algebra, art)
(18) Bernoulli Polynomials and Bernoulli Numbers: various mathematicians (combinatorics, number theory, analysis)
(19) Eulerian Numbers: Euler, MacMahon (combinatorics, number theory)
(20) Historical Development of the Integral: Archimedes, Newton, Leibniz, Cauchy, Riemann, Lebesgue (calculus, analysis)
(21) Non-Euclidean Geometry: Bolyai, Gauss, Lobachevsky, Poincaré, others (geometry)
(22) Fibonacci and Lucas numbers: various mathematicians (number theory, combinatorics)
(23) Complex and Quaternionic numbers: Hamilton (number theory, geometry)

(24) The Sylvester-Gallai theorem: Sylvester, Gallai (plane geometry)
(25) Error-correcting codes: Shannon, Hamming, MacWilliams (linear and modern algebra)
(26) The Erdős-Ko-Rado Theorem: Erdős (combinatorics)
(27) Galois' Theorem regarding solvability of polynomials by radicals: Galois (classical and modern algebra)
(28) Abel's Theorem regarding the unsolvability of the quintic by radicals: Abel (classical algebra)
(29) Quadratic Reciprocity: Gauss (elementary number theory)
(30) Fundamental Theorem of Algebra: Euler, Gauss (classical algebra)
(31) Hilbert's Third Problem: Hilbert, Dehn (geometry)
(32) Brouwer Fixed Point Theorem: Brouwer (topology)
(33) The Cayley-Hamilton Theorem: Cayley (linear algebra)
(34) Lagrange's Theorem for finite subgroups of a finite group: Lagrange (modern algebra)
(35) Euler's Formula for polyhedra: Euler (discrete geometry)
(36) Finite and Fast Fourier Transforms: Gauss, Cooley, Tukey (linear algebra, analysis)