Short Accessible Papers on Commutative Algebra
Criteria: Generally under 10 pages. Accessible after
a first (sometimes second) course in Commutative Algebra.
Presentable by a student, to students, in a one-hour seminar talk.

List Compiled by David Eisenbud and Craig Huneke.

AG: = algebraic geometry
HA: = homological algebra
IT: = ideal theory
MT: = module theory
CP: = char p methods
GA: group actions
RT: ring theory
GB: Groebner bases
MI: monomial ideals

AG Mumford, David The topology of normal singularities of an algebraic surface and a criterion for simplicity. Inst. Hautes √atudes Sci. Publ. Math. No. 9 1961 5--22.

AG, HF, IT: Theorie des intersections et theoreme de Riemann-Roch. Seminaire de Geometrie Algebrique du Bois-Marie 1966--1967 (SGA 6). Dirige par P. Berthelot, A. Grothendieck et L. Illusie. Avec la collaboration de D. Ferrand, J. P. Jouanolou, O. Jussila, S. Kleiman, M. Raynaud et J. P. Serre. Lecture Notes in Mathematics, Vol. 225. Springer-Verlag, Berlin-New York, 1971. Gives the boundedness of the Hilbert function of homogeneous domains in terms of the first two Hilbert coefficients.

AG, IT: Sturmfels, Bernd; Trung, Ngo Viet; Vogel, Wolfgang Bounds on degrees of projective schemes. Math. Ann. 302 (1995), no. 3, 417--432. Bounds for the arithmetic degree of monomial ideals and geometric degree of homogeneous prime ideals.

AG Arapura, Donu; Jaffe, David B. On Kodaira vanishing for singular varieties. Proc. Amer. Math. Soc. 105 (1989), no. 4, 911--916.

AG Artin, Michael On isolated rational singularities of surfaces. Amer. J. Math. 88 1966 129--136.

AG Brieskorn, Egbert V. Examples of singular normal complex spaces which are topological manifolds. Proc. Nat. Acad. Sci. U.S.A. 55 1966 1395--1397. (Reviewer: F. Hirzebruch))

CP, HA: Huneke, Craig; Lyubeznik, Gennady Absolute integral closure in positive characteristic. Adv. Math. 210 (2007), no. 2, 498--504. The absolute integral closure in char. p is Cohen-Macaulay.

CP, IT: Katzman, Mordechai Finiteness of $\bigcup\sb e{\rm Ass}\,F\sp e(M)$ and its connections to tight closure. Illinois J. Math. 40 (1996), no. 2, 330--337. Constructs an example of an ideal I such that the union of the associated primes of its Frobenius powers is infinite.

CP: Hochster, Melvin; Huneke, Craig Tight closure. Commutative algebra (Berkeley, CA, 1987), 305--324, Math. Sci. Res. Inst. Publ., 15, Springer, New York, 1989. Introduces tight closure theory and gives some applications.

CP: Monsky, P. The Hilbert-Kunz function. Math. Ann. 263 (1983), no. 1, 43--49. Proves the existence of the Hilbert-Kunz multiplicity.

GA, CP, AG: Knop, F. Die Cohen-Macaulay-Eigenschaft eines Invariantenrings Available at

http://math.rutgers.edu/~knop/papers/CM.html Gives a short proof of the Hochster-Roberts theorem that invariants of reductive groups are Cohen-Macaulay.

GA, IT: Roberts, Paul An infinitely generated symbolic blow-up in a power series ring and a new counterexample to Hilbert's fourteenth problem. J. Algebra 132 (1990), no. 2, 461--473. Another example concerning the non finite generation of rings of invariants.

GA, RT: Roberts, Paul Abelian extensions of regular local rings. Proc. Amer. Math. Soc. 78 (1980), no. 3, 307--310. Proves that the integral closure of a regular local ring in an abelian Galois extension field is Cohen-Macaulay.

GA: Chevalley, Claude Invariants of finite groups generated by reflections. Amer. J. Math. 77 (1955), 778--782. As in the title.

GA: Derksen, Harm Degree bounds for syzygies of invariants. Adv. Math. 185 (2004), no. 2, 207--214. See title.

GA: Flatto, Leopold Invariants of finite reflection groups. Enseign. Math. (2) 24 (1978), no. 3-4, 237--292. A survey, to go along with the paper of Chevalley.

GA: Steinberg, Robert Nagata's example. Algebraic groups and Lie groups, 375--384, Austral. Math. Soc. Lect. Ser., 9, Cambridge Univ. Press, Cambridge, 1997. Example of an additive group action whose invariants are not finitely generated.

GB, HA: Bayer, David; Stillman, Michael A criterion for detecting m-regularity. Invent. Math. 87 (1987), no. 1, 1--11. Basic properties of generic initial ideals in revlex.

GB, HA: Caviglia, Giulio; Sbarra, Enrico Characteristic-free bounds for the Castelnuovo-Mumford regularity. Compos. Math. 141 (2005), no. 6, 1365--1373. Gives a nice characteristic-free proof of bounds on Castelnuovo-Mumford regularity.

GB, IT: Conca, Aldo(I-GENO) Reduction numbers and initial ideals. (English summary) Proc. Amer. Math. Soc. 131 (2003), no. 4, 1015--1020

GB: Green, Mark Restrictions of linear series to hyperplanes, and some results of Macaulay and Gotzmann. Algebraic curves and projective geometry (Trento, 1988), 76--86, Lecture Notes in Math., 1389, Springer, Berlin, 1989. First two sections give nice proofs of Macaulay's theorem and other basic results.

HA: Gasharov, Vesselin N.; Peeva, Irena V. Boundedness versus periodicity over commutative local rings. Trans. Amer. Math. Soc. 320 (1990), no. 2, 569--580. Counterexample of question of Eisenbud on periodic resolutions.

HA: Avramov, Luchezar L.; Lescot, Jack Bass numbers and Golod rings. Math. Scand. 51 (1982), no. 2, 199--211 (1983). Inequalities on the Bass numbers.

HA, CP: Hochster, Melvin Topics in the homological theory of modules over commutative rings. Expository lectures from the CBMS Regional Conference held at the University of Nebraska, Lincoln, Neb., June 24--28, 1974. Conference Board of the Mathematical Sciences Regional Conference Series in Mathematics, No. 24. Published for the Conference Board of the Mathematical Sciences by the American Mathematical Society, Providence, R.I., 1975. In particular see the proof of the existence of Big Cohen-Macaulay modules in char p.

HA, IT: Kodiyalam, Vijay Asymptotic behaviour of Castelnuovo-Mumford regularity. Proc. Amer. Math. Soc. 128 (2000), no. 2, 407--411. The regularity of the power of an ideal are bounded by a linear function of the exponent. Also extended to symmetric powers of modules.

HA, MI: Eagon, John A.; Reiner, Victor Resolutions of Stanley-Reisner rings and Alexander duality. J. Pure Appl. Algebra 130 (1998), no. 3, 265--275. Proves that a square-free monomial ideal is Cohen-Macaulay iff its Alexander dual has linear resolution.

HA: Eisenbud, David Homological algebra on a complete intersection, with an application to group representations. Trans. Amer. Math. Soc. 260 (1980), no. 1, 35--64. Sections 5 and 6 describe the Cohen-Macaulay modules over hypersurfaces in terms of matrix factorizations.

HA: Eisenbud, David; Green, Mark L. Ideals of minors in free resolutions. Duke Math. J. 75 (1994), no. 2, 339--352. Fitting ideals and properties of infinite free resolutions. Proves a conjecture of Huneke.

HA: Heitmann, Raymond C. A counterexample to the rigidity conjecture for rings. Bull. Amer. Math. Soc. (N.S.) 29 (1993), no. 1, 94--97. As in title.

HA: Herzog, J.; K\"uhl, M. On the Betti numbers of finite pure and linear resolutions. Comm. Algebra 12 (1984), no. 13-14, 1627--1646. Betti numbers of a pure free resolution are determined by the degrees.

HA: Tate, John Homology of Noetherian rings and local rings. Illinois J. Math. 1 (1957), 14--27. Resolution of the residue field of a local ring.

HA: Wang, Hsin-Ju On the Fitting ideals in free resolutions. Michigan Math. J. 41 (1994), no. 3, 587--608. Fitting ideals and properties of infinite free resolutions. Relates them to Jacobian ideals.

HF, IT: Reid, Les(1-SWMOS); Roberts, Leslie G.(3-QEN); Roitman, Moshe(IL-HAIF) On complete intersections and their Hilbert functions. Canad. Math. Bull. 34 (1991), no. 4, 525--535. Proves "Hard Lefschetz Theorem" for certain complete intersections.

IT, AG: Eisenbud, David; Evans, E. Graham, Jr. Every algebraic set in n-space is the intersection of n\ hypersurfaces. Invent. Math. 19 (1973), 107--112.

IT, GB, HA: Derksen, Harm; Sidman, Jessica A sharp bound for the Castelnuovo-Mumford regularity of subspace arrangements. Adv. Math. 172 (2002), no. 2, 151--157. Intersections and products of ideals of linear forms.

IT: Valabrega, Paolo; Valla, Giuseppe Form rings and regular sequences. Nagoya Math. J. 72 (1978), 93--101. Gives classical criterion for a regular sequence in I to be regular in the associated graded ring of I.

IT, HA: Eisenbud, David Some directions of recent progress in commutative algebra. Algebraic geometry (Proc. Sympos. Pure Math., Vol. 29, Humboldt State Univ., Arcata, Calif., 1974), pp. 111--128. Amer. Math. Soc., Providence, R.I., 1975. Regular local ring of dimension three modulo an element is factorial iff the element is not a determinant (last section of paper)

IT, HA: Kunz, Ernst Almost complete intersections are not Gorenstein rings. J. Algebra 28 (1974), 111--115.

IT, HF: Stanley, Richard P. On the Hilbert function of a graded Cohen-Macaulay domain. J. Pure Appl. Algebra 73 (1991), no. 3, 307--314. Characterizes hilbert functions of domains

IT: Bruns, Winfried The Eisenbud-Evans generalized principal ideal theorem and determinantal ideals. Proc. Amer. Math. Soc. 83 (1981), 19--24. A generalization of Krull's principal ideal theorem to modules.

IT: Burch, Lindsay A note on the homology of ideals generated by three elements in local rings. Proc. Cambridge Philos. Soc. 64 1968 949--952. Proves that three generated ideals can have aribitrary depth. Later generalized greatly by Bruns.

IT: Cowsik, R. C.; Nori, M. V. Affine curves in characteristic p are set theoretic complete intersections. Invent. Math. 45 (1978), no. 2, 111--114 As the title states.

IT: Cowsik, R. C.; Nori, M. V. On the fibres of blowing up. J. Indian Math. Soc. (N.S.) 40 (1976), no. 1-4, 217--222 (1977). Relates annalytic spread to depths of the ring modulo powers of an ideal.

IT: Eisenbud, David; Hochster, Melvin A Nullstellensatz with nilpotents and Zariski's main lemma on holomorphic functions.J. Algebra 58 (1979), no. 1, 157--161. Relates an arbitrary ideal to the maximal ideal containing it.

IT: Goto, Shiro Integral closedness of complete-intersection ideals. J. Algebra 108 (1987), no. 1, 151--160.

IT: Hochster, M. Properties of Noetherian rings stable under general grade reduction. Arch. Math. (Basel) 24 (1973), 393--396. Various generic Bertini type theorems.

IT: Hochster, Melvin The Zariski-Lipman conjecture in the graded case. J. Algebra 47 (1977), no. 2, 411--424. (First part of paper)

IT: Huneke, Craig The primary components of and integral closures of ideals in 3-dimensional regular local rings. Math. Ann. 275 (1986), no. 4, 617--635. First part of paper proves that symbolic powers of primes in regular rings are rarely equal to the powers.

IT: Johnston, Bernard; Katz, Daniel Castelnuovo regularity and graded rings associated to an ideal. Proc. Amer. Math. Soc. 123 (1995), no. 3, 727--734. Gives necessary and sufficient conditions for Rees algebras of ideals to be Cohen-Macaulay.

IT: Northcott, D. G.; Rees, D. Reductions of ideals in local rings. Proc. Cambridge Philos. Soc. 50, (1954). 145--158.

IT: Vasconcelos, Wolmer V. Ideals generated by R-sequences. J. Algebra 6 1967 309--316. If I/I^2 if free, and I has finite projective dimension, then I is generated by a regular sequence.

IT: Yao, Yongwei Primary decomposition: compatibility, independence and linear growth. Proc. Amer. Math. Soc. 130 (2002), no. 6, 1629--1637 This proves a new uniqueness result for primary decompositions.

MI: Herzog, J\"urgen A generalization of the Taylor complex construction. Comm. Algebra 35 (2007), no. 5, 1747--1756. The Taylor resolution of monomial ideals is generalized.

MI: Lyubeznik, Gennady A new explicit finite free resolution of ideals generated by monomials in an R-sequence. J. Pure Appl. Algebra 51

(1988), no. 1-2, 193--195. Betters the Taylor resolution.

MT: Singh, Anurag K. p-torsion elements in local cohomology modules. Math. Res. Lett. 7 (2000), no. 2-3, 165--176. Counterexample to a question of Huneke concerning associated primes of local cohomology modules.

MT, HA: Evans, E. Graham; Griffith, Phillip The syzygy problem. Ann. of Math. (2) 114 (1981), no. 2, 323--333. Lower bound for the rank of syzygy modules, and applications.

MT, HA: Huneke, Craig; Leuschke, Graham J. On a conjecture of Auslander and Reiten. J. Algebra 275 (2004), no. 2, 781--790 Uses Miyata's result to give a short proof of Auslander's theorem that rings of finite CM type have isolated singularities.

MT, HA: Matlis, Eben Injective modules over Noetherian rings. Pacific J. Math. 8 1958 511--528. (Reviewer: G. Azumaya) 18.00 The original paper giving the structure of injective modules over Noetherian rings.

MT, HA: Miyata, Takehiko Note on direct summands of modules. J. Math. Kyoto Univ. 7 1967 65--69. Proves that sequences that look split are split.

MT: Bongartz, Klaus A generalization of a theorem of M. Auslander. Bull. London Math. Soc. 21 (1989), no. 3, 255--256. Proves that two modules are isomorphic iff the lengths are the same after applying Hom into modules of finite length.

MT: Brodmann, M. Asymptotic stability of ${\rm Ass}(M/I\sp{n}M)$. Proc. Amer. Math. Soc. 74 (1979), no. 1, 16--18. As in title.

MT: Eisenbud, David; de la Pe√±a, J. A. Chains of maps between indecomposable modules. J. Reine Angew. Math. 504 (1998), 29--35. Bounds the length of chains of maps of indecomposable modules.

MT: Gruson, L. Dimension homologique des modules plats sur an anneau commutatif noeth\'erien. (French) Symposia Mathematica, Vol. XI (Convegno di Algebra Commutativa, INDAM, Rome, 1971), pp. 243--254. Academic Press, London, 1973. If M is a faithful A-module, then every A-module admits a finite filtration with factors that are homomorphic images of sums of copies of M.

MT: Kaplansky, Irving Projective modules. Ann. of Math (2) 68 1958 372--377 Proves that projective modules over local ring are free.

MT: Swan, Richard G. The number of generators of a module. Math. Z. 102 1967 318--322. Compares the local and global number of generators.

RT: Bertin, Marie-Jos\'e Anneaux d'invariants d'anneaux de polynomes, en caract\'eristique p. (French) C. R. Acad. Sci. Paris S\'er. A-B 264 1967 A653--A656. Gives examples of non Cohen-Macaulay factorial rings.

RT: Claborn, Luther Dedekind domains and rings of quotients. Pacific J. Math. 15 1965 59--64. Class group of a Dedekind Domain can be arbitrary.

RT: Eisenbud, David Subrings of Artinian and Noetherian rings. Math. Ann. 185 1970 247--249. Proves that a ring with a module-finite Noetherian ring extension is itself Noetherian.

RT: Lech, Christer A method for constructing bad Noetherian local rings. Algebra, algebraic topology and their interactions (Stockholm,

1983), 241--247, Lecture Notes in Math., 1183, Springer, Berlin,1986. (Reviewer: Luchezar L. Avramov) 13B35 (13C15 13H99) Gives necessary and sufficient conditions for a complete Noetherian local ring S to be the completion of a local domain.

RT: Leedham-Green, C. R. The class group of Dedekind domains. Trans. Amer. Math. Soc. 163 (1972), 493--500. A sharpening of the paper of Claborn.

RT: Lipman, Joseph Unique factorization in complete local rings. Algebraic geometry (Proc. Sympos. Pure Math., Vol. 29, Humboldt State Univ., Arcata, Calif., 1974), pp. 531--546. Amer. Math. Soc., Providence, R.I., 1975. As in the title.

RT: Matsumura, Hideyuki On the dimension of formal fibres of a local ring. Algebraic geometry and commutative algebra, Vol. I, 261--266, Kinokuniya, Tokyo, 1988. Shows that the dimension of the formal fiber of 0 in a local domain which is finitely generated over a field is one less than the dimension of the ring.

RT: Seidenberg, A. Derivations and integral closure. Pacific J. Math. 16 1966 167--173. A derivation of a domain R to itself in char 0 also takes the integral closure of R to itself.