

January 3, 2016

LEROY B. BEASLEY

BIRTHDATE: July 31, 1942

BIRTHPLACE: Shelley, ID

EDUCATION:

Institution	Dates Attended	Degree	Maj/Min
Idaho State Univ.	1960-1964	BS	Math/Span.
Idaho State Univ.	1964-1966	MS	Math
Univ. of Brit.Col.	1966-1969	PhD	Math
Boise State Univ.	1971-1972	Sec. Teaching Certificate	

STUDENT AWARDS:

Post Doctoral Fellowship - Univ. of British Columbia - 1969

ACADEMIC EXPERIENCE:

Math Inst. & Head, Math Dept. - MiddletonHigh School - 1972-1981  
Asst. Prof. - USU - 1981-85  
Assoc. Prof. - USU - 1985-1991  
Visiting Prof. - UniversityCollege, Dublin, IRELAND - 1987-88  
Professor - USU - 1991-2013  
Professor Emeritus - Utah State University- 2013-Present

NONACADEMIC EXPERIENCE:

U.S. Army-ORSA Officer for 1 year in Vietnam (MACCORDS-RAD/A)-1971

LEAVES OF ABSENCE

September 1987 - June 1988, Sabbatical Leave, Spent in Ireland at Univ.College, Dublin.  
September - December 1991, Special Leave. Invited Participant in the Special Year in Linear Algebra at the Institute for Mathematics and Its Applications, University of Minnesota  
September 1994 - June 1995, Sabbatical Leave. Spent at St. Cloud State University, Minnesota; University of Regina, QueensUniversity, (Kingston, Ontario), University of Waterloo, Canada; The Technion - Israel Institute of Technology, Israel; The Centro de Algebra da Universidade de Lisboa, Portugal; and UniversityCollege, Dublin, Ireland.  
May 2001- June 2002, Sabbatical Leave. Spent at SungKyunKwanUniversity, ChejuNationalUniversity and PoHangNationalUniversity (Korea), University of Wyoming, University of Regina, Universidad Politecnica de Valencia in Valencia and in Alcoi, Spain, and UniversityCollege, Dublin, Ireland  
May2008-June 2009 Sabbatical Leave. Spent at USU, MoscowState Univewrsity (LomonosovUniv.), and University College, Ireland, Dublin, Ireland.

## Masters Students:

### Completed:

Susan Loveland, M.S., 1985

Finished PhD at USU

Sang-Gu Lee, M.S., 1986

Finished PhD. At USU (see below)

Sarah Natividad, 2000

Continuing at USU

## Ph.D. Students

### Completed:

Daniel Scully, Ph.D., 1988

Associate Professor at St. Cloud State University, Minn.

Author of approximately 8 papers. Co-author of papers # 55, 60 below.

Sang-Gu Lee, Ph.D. 1991

Full Professor at SungKyunKwanUniversity in SuwonKorea

over 20 publications

Has produced 9 Ph.D. students, several MS students. Co-author of papers # 42, 52, 53, 58, 61, 69, 71, 72, 73, 75, 76, 78, 80, 82, 88, 91 and 100 below (original result papers) and other proceedings papers.

Shumin Ye, Ph.D., 1993

Co-author of papers # 56, 57 below.

Cora Lee Neal, Ph.D. 2001

Strategic Planning Manager, Wells Fargo, Bay area

Co-author of papers # 84, 89, and 90 below.

Russel Carlson, Ph.D., 2002

Assistant Professor at BYU-Hawaii

## External Examiner:

Ph. D. of Mr. Chooi Wai Leong of the University of Malaysia. 2002

Ph. D. of Mr K. Somasundaram of Bharathair University, India. 2004

Ph. D. of Mr. Raja Mukherji of the National University of Ireland, 2010

M. S. of Ms Sin-Chee Tan of the University of Malaysia. 2011

M. S. of Mr Ng Zhen Chuan of the University of Malaysia. 2012

Ph.D. of Mr. P. Subramanian of Amrita Vishwa Vidyapeetham University, India 2013

Ph.D. of Mr. Joshua Tan Juat Huan of the University of Malaysia. 2014

Ph.D. of Ms. Preeti Mohindru or the University of Guelph, Canada. 2014

## CONSULTING ACTIVITIES

September 1995-present, for Ken Pedersen, Patent Attorney, Boise, Idaho

PUBLICATIONS

Refereed Scholarly Papers/Articles containing original results:

1. "Bounds for permanents, determinants and Schur functions", (with J. L. Brenner), J. ALG., 10(1968), 134-148. **MR:** 37#5233
2. "Maximal groups on which the permanent is multiplicative", CAN. J. MATH., 21(1969), 495-497. **MR:** 41#1757
3. "Linear transformations on matrices: the invariance of rank  $k$  matrices", LIN. ALG. & ITS APPL., 3(1970), 407-427. **MR:** 42#6010
4. "Linear transformations on matrices, the invariance of the third elementary symmetric function", CAN. J. MATH., 22(1970), 746-752. **MR:** 42#3100
5. "Permanent groups", (with L. J. Cummings), PROC. AMER. MATH. SOC., 34(1972), 351-355. **MR:** 54#7495
6. "Permanent groups, II", (with L. J. Cummings), PROC. AMER. MATH. SOC., 40(1973), 358-364. **MR:** 47#8571
7. "Permanent semigroups", (with L. J. Cummings), LIN. AND MULTILIN. ALG., 5(1978), 297-302. **MR:** 57#6049
8. "Linear transformations on matrices: the invariance of commuting pairs of matrices", LIN. AND MULTILIN. ALG., 6(1978), 179-183. **MR:** 80a: 15003
9. "Space of matrices of equal rank", LIN. ALG. & ITS APPL., 38(1981), 227-237. **MR:** 82m: 15002.
10. "Linear transformations which preserve fixed rank", LIN. ALG. AND ITS APPL., 40(1981), 183-187. **MR:** 83c: 15004
11. "Multiplicative properties of generalized matrix functions", (with L. J. Cummings), LIN. AND MULTILIN. ALG., 11(1982), 23-31. **MR:** 84h: 15008
12. "Maximal incidence algebras", (with four others), ARS. COMBINATORIA, 13(1982), 145-147.
13. "Linear transformations on matrices: the invariance of sets of ranks", LIN. ALG. AND ITS APPL., 48(1982), 25-35. **MR:** 84e: 15001
14. "Linear transformations preserving sets of ranks", ROCKY MT. J. OF MATH, 13(1982), 299-307. **MR:** 84m: 15004.
15. "On the uniqueness of generalized matrix functions", (with L. J. Cummings), PROC. AMER. MATH. SOC., 87(1983), 229-232. **MR:** 84d: 15004.
16. "Generalized matrix functions of class MPW", LIN. AND MULTILIN. ALG., 12(1983), 273-280. **MR:** 85c: 15011a.
17. "Generalized matrix functions of class MPW II", LIN. AND MULTILIN. ALG., 13(1983), 87-95. **MR:** 85c: 15011b .
18. "Rank- $k$ -preservers and preservers of sets of ranks", LIN. ALG. AND ITS APPL., 55(1983) 11-17. **MR:** 84k:15002.

PUBLICATIONS

Refereed Scholarly Papers/Articles containing original results:

19. "Boolean rank preserving operators and Boolean rank-1 spaces", (with N. J. Pullman), LIN. ALG. AND ITS APPL., 59 (1984) 55-77. **MR:** 85i: 15004.
20. "Generalized matrix function of class MPW, III", LIN. AND MULTILIN. ALG., 15(1984) 175-186. **MR:** 85g: 15013.
21. "Nonnegative rank preserving operators", (with N. J. Pullman and D. A. Gregory), LIN. ALG AND ITS APPL., 65(1985) 207-223. **MR:** 86b: 15002.
22. "Test sets for generalized matrix functions", (with L. J. Cummings), LIN. AND MULTILIN. ALG., 17(1985) 301-307. **MR:** 87a: 15007.
23. "The null space of spaces of singular matrices", LIN. AND MULTILIN. ALG., 18(1985) 249-254. **MR:** 87c: 15004.
24. "Fuzzy rank preserving operators", (with N. J. Pullman), LIN. ALG. AND ITS APPL., 73(1986) 197-211. **MR:** 87b: 15001.
25. "Two-generator groups, IV: Conjugate pairs of generators in  $PSL(2,q)$ ,  $PSL(3,p)$ . The spread of the Mathieu groups. Cospread. Outer dimension", (with J. L. Brenner), CONGRESSUS NUMERANTIUM, 53(1986) 95-112. **MR:** 88f: 20052.
26. "Term rank, permanent and rook polynomial preservers", (with N. J. Pullman), LIN. ALG. AND ITS APPL., 90(1987) 33-46. **MR:** 88f: 15002.
27. "The null space of spaces of matrices of bounded rank", PROC. OF THE 1986 AUBURN UNIVERSITY INTERNATIONAL MATRIX THEORY CONFERENCE., Current Trends in Matrix Theory, F. Uhlig and R. Grone. eds., Elsevier, N. Y. 1987, pp. 45-50. **MR:** 88h: 15021.
28. "Generation of alternating groups by pairs of conjugates", (with J. L. Brenner, P. Erdos, M. Szalay and A. G. Williamson), PERIODICA HUNGARICA, 18(4) (1987) 259-269. **MR:** 88j: 20006.
29. "Operators that preserve semiring matrix functions", (with N. J. Pullman), LIN. ALG. AND ITS APPL., 99(1988) 199-216. **MR:** 89b: 15041.
30. "Semiring rank vs column rank", (with N. J. Pullman), LIN. ALG. AND ITS APPL., 101(1988) 33-58. **MR:** 89e: 15003.
31. "Linear operators on matrices: the invariance of rank-k matrices", LIN. ALG. AND ITS APPL., 107(1988) 161-167. **MR:** 89h: 15004.
32. "Linear operators strongly preserving primitivity", (with N. J. Pullman) LIN. & MULTILIN. ALG., 25(1989) 205-213. **MR:** 90h: 15004.
33. "Linear operators strongly preserving commuting pairs of Boolean matrices", (with N.J. Pullman), LIN. ALG. AND ITS APPL., 132(1990) 137-143. **MR:** 91i: 15018.
34. "Linear operators on matrices: the invariance of rank- k matrices", (with T. J. Laffey), LIN. ALG. AND ITS APPL., 133(1990) 175-184. **MR:** 91f:15008, Addendum: **MR:** 93h: 15002.
35. "Linear Operators Preserving Properties of Graphs", (with N.J. Pullman), CONGRESSUS NUMERANTIUM, 70(1990) 105-112. **MR:** 91b: 05090.

PUBLICATIONS

Refereed Scholarly Papers/Articles containing original results:

36. "Linear operators strongly preserving digraphs whose maximum cycle length is small", (with N.J. Pullman) LIN. AND MULTILIN. ALG., 28(1990) 111-117. **MR:** 91m:05090.
37. "Linear operators that preserve term rank 1", (with N.J. Pullman) PROC. OF THE ROYAL IRISH ACADEMY, 91A(1990) 71-78. **MR:** 93h: 15011.
38. "Linear operators preserving commuting pairs of fuzzy matrices", (with N. J. Pullman), FUZZY SETS & SYSTEMS, 41(1991) 167-173. **MR:** 92b: 15039.
39. "Linear operators preserving idempotent matrices over fields", (with N.J. Pullman). LIN. ALG. AND ITS APPL., 146(1991) 7-20. **MR:** 91m: 15003.
40. "Schur extensions of monomial matrix groups", (with L.J. Cummings), LIN ALG. AND ITS APPL., 161(1992)11-26. **MR:** 93a: 15008.
41. "Linear operators strongly preserving idempotent matrices over semirings", (with N. J. Pullman), LIN. ALG. & ITS APPL., 160(1992) 217-229. **MR:** 93b: 15002.
42. "Linear operators strongly preserving r-potent matrices over semirings", (with S.G. Lee), LIN. ALG. & ITS APPL. 162-164(1992) 589-599. **MR:** 93a: 15029.
43. "A comparison of nonnegative real ranks and their preservers", (with S.Z. Song), LINEAR AND MULTILIN. ALG. 31(1992) 37-46. **MR:** 93j: 15002.
44. "Multiplicativity of generalized permanents over semi-rings", (with L. J. Cummings), GRAPHS, MATRICES, AND DESIGNS, Lecture Notes in Pure and Applied Mathematics, vol. 39, Marcel Dekker, (1992) 121-132. **MR:** 94a: 15007.
45. "Polynomials which permute matrices over commutative antinegative semirings", (with N.J. Pullman), LIN. ALG. AND ITS APPL., 165(1992), 167-172. **MR:** 93a: 16028.
46. "Linear operators that strongly preserve graphical properties of matrices", (with N. J. Pullman), DISCRETE MATH., 104(1992) 143-157. **MR:** 93k: 05113.
47. "Linear operators preserving partition numbers of graphs", GRAPHS, MATRICES, AND DESIGNS, Lecture Notes in Pure and Applied Mathematics, Vol. 39, Marcel Dekker, (1992) 19-30. **MR:** 93m: 05146.
48. "The structure of generalized permanent semigroups", (with L.J. Cummings), LIN. ALG. AND ITS APPL., 184 (1993) 235-248. **MR:** 94f: 15007.
49. "Linear operators that strongly preserve the index of imprimitivity", (with N.J. Pullman), LINEAR AND MULTILINEAR ALGEBRA, 31 (1992) 267-283. **MR:** 94b: 15021.
50. "Linear operators that strongly preserve upper ideals of matrices", (with N.J. Pullman) CONGRESSUS NUMERANTIUM, 88(1992) 229-244. **MR:** 93k: 15027.
51. "Combinatorial orthogonality", (with R.A. Brualdi and B.L. Shader), IMA VOL. IN MATH. AND ITS APPL., VOL 50, (1993) 207-218. **MR:** 94e: 15038.
52. "Linear operators strongly preserving r-cyclic matrices over semirings", (with S.G. Lee) LIN. AND MULTILIN. ALG. 35(1993) 325-338. **MR:** 96a: 16051.

PUBLICATIONS

Refereed Scholarly Papers/Articles containing original results:

53. "Linear operators preserving the set of matrices for which  $p(X) = X$  over semirings", (with S.-G. Lee), J. KOREAN MATH SOC., 31(1994) 353-365. **MR:** 96a: 05029.
54. "Rank comparisons"(with S. J. Kirkland and B.L. Shader), LINEAR ALGEBRA AND ITS APPL., 221(1995) 171-188. **MR:** 96b: 15001.
55. "Linear operators which preserve combinatorially orthogonality", (with D. J. Scully), LINEAR ALGEBRA AND ITS APPL. 201(1994) 171-180. **MR:** 95b: 15002.
56. "Linear operators that preserve sign nonsingular matrices", (with Shumin Ye), LINEAR ALGEBRA AND ITS APPL. 223(1995) 15-29. **MR:** 95m: 15008.
57. "Linear operators preserving L-matrices", (with Shumin Ye), LINEAR ALGEBRA AND ITS APPL. 223(1995) 89-98. **MR:** 96e: 15002.
58. "Linear transformations that preserve the assignment", (with G.-Y. Lee and S.-G. Lee), LINEAR ALGEBRA AND ITS APPL. 212/213(1994)387-396. **MR:** 95i: 15007.
59. "Preservers of a fixed degree sequence", CONGRESSUS NUMERANTIUM, 100(1995) 27-31. **MR:** 96k: 04194.
60. "Sign rank-k matrices", (with D.J. Scully), CONGRESSUS NUMERANTIUM, 106(1995) 47-53. **MR:** 96c: 05028.
61. "Linear transformations that preserve the assignment, II", (with G.-Y. Lee and S.-G. Lee), JOURNAL OF THE KOREAN MATH. SOC., 33(1996) 527-529. **MR:** 97h: 15001.
62. "On the exponent of a primitive matrix containing a primitive submatrix", (with S. J. Kirkland), LIN. ALG. & APP., 261(1997)195-205. **MR:** 98c: 15062.
63. "Orthogonal decomposable tensors", (with J.A. Dias da Silva), LIN. & MULTILIN. ALG., 42(1997) 1-21. **MR:** 98h: 15052.
64. "Rank preservers on spaces of symmetric matrices", (with R. Loewy and R. Meshulam),LIN. & MULTILIN. ALG., 43(1997) 63-86. **MR:** 98k: 15002.
65. "On a positive linear map preserving absolute values", (with A.-H. Kim and W.Y. Lee), LIN. ALG. & APPL., 260(1997)311-318. **MR:** 98c: 46110.
66. "Linear operators which preserve pairs on which the rank is additive", JOURNAL OF THE KOREAN SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS, 2(2)(1998) 27-30.
67. "Linear operators that strongly preserve graphical properties of matrices - II", (with S. J. Monson and N.J. Pullman), DISCRETE MATH., 195(1999) 53-66. **MR:** 99j: 15004.
68. "Spaces of rank-2 matrices over  $GF(2)$ ",ELECTRONIC JOURNAL OF LINEAR ALGEBRA, 5(1999) 11-18. **MR:** 99k: 15031.
69. "Linear operators strongly preserving multivariate majorization with  $T(I)=I$ .", (with S-G Lee and Y-H Lee), KYUNGPOOK MATHEMATICS JOURNAL, 39#1(1999) 191-194. **MR:** 2000f: 15002.
70. "Linear operators strongly preserving multivariate majorization.", (with S-G Lee and Y-H Lee), LIN ALG & APPL, 304(2000)141-159.

PUBLICATIONS

Refereed Scholarly Papers/Articles containing original results:

71. "Linear preservers of matrices of rank-2", (with T.J. Laffey), LIN. & MULTILIN. ALG., 48(2001) 319-331.
72. "Zero-term rank preservers", (with S.-Z. Song and S.-G. Lee), LIN. & MULTILIN. ALG., 48(2001) 313-318.
73. "Linear operators that preserve the zero-term rank of Boolean matrices, (with S.-Z. Song and S.-G. Lee), JOURNAL OF THE KOREAN MATHEMATICAL SOCIETY, 36(1999) 1181-1190. **MR:** 2001c: 15004.
74. "Idempotence of  $(1,-1)$  matrices", (with S.G. Lee and S.-W. Park), CONGRESSUS NUMERANTIUM, 146(2000) 17-24. **MR:** 2001m: 15044.
75. "An inequality on permanents of Hadamard products", BULL, KOREAN MATH. SOC. 37(2000) 633-639. **MR:** 2001g: 15005.
76. "Linear operators preserving multivariate majorization", (with S.-G. Lee) , LIN. ALG. & APP., 306(2000) 141-159. **MR:** 2000i: 15005.
77. "Weights of idempotent matrices, (with S.-G. Lee and S.-W. Park), TRENDS IN MATHEMATICS, 4(2001) 95-100.
78. "Linear operators that strongly preserve graphical properties of matrices - III", (with S. J. Monson and N.J. Pullman), CONGRESSUS NUMERANTIUM, 146(2000) 65-77. **MR:** 2002a: 15002.
79. "Resolution of a conjecture on strong preservers of multivariate majorization", (With S.-G. Lee and Y.-H. Lee), BULL., KOREAN MATH. SOC., 39(2002) 283-287. **MR:** 1 903 621.
80. "Irreducible, pattern  $k$ -potent ray pattern matrices", With J. L. Stuart and B. L. Shader), LIN. ALG. & APP., 34(2002) 261-271. **MR:** 1 897 830.
81. "Linear operators that preserve pairs of matrices which satisfy extreme rank properties", (With S.-G. Lee and S.-Z. Song), LIN. ALG. & APP., 350(2002) 263-272. **MR:** 1 906 757.
82. "Linear operators that preserve zero-term rank over fields and rings", (with S.-Z. Song), LIN. ALG. & APP., 341(2002) 143-149. **MR:** 1 873 615.
83. "A characterization of strong preservers of matrix majorization", (With S.-G. Lee and Y.-H. Lee), LIN. ALG. & APP., 367C(2003) 341-346.
84. "Nonnegative sign patterns which allow normality over  $Z$ ", (With G.-S. Cheon, S.-W. Park and H.-G. Seol), JAPANESE J. OF ALG. & NUMBER THEORY, 1(2002) 133-141. **MR:** 1 900 966.
85. "Linear preservers for Sylvester and Frobenius bounds on matrix rank.", (with Alexander Guterman and Cora Neal), ROCKY MTN J. MATH., 36(2006)67-80.
86. "Linear operators that preserve commuting pairs of nonnegative real matrices", (with S.-Z. Song), LIN. & MULTILIN. ALG., 51(2003) 279-283.
87. "Properties of a covariance matrix with an application to D-optimal design", (With Z. Zhu and D. Coster), ELECTRONIC JOURNAL OF LINEAR ALGEBRA, 10(2003) 65-76.
88. "A note on  $k$ -primitive directed graphs", (With S. J. Kirkland), LIN. ALG. & APPL., 373(2003)67-74.

PUBLICATIONS

Refereed Scholarly Papers/Articles containing original results:

89. "Inverse principally centrogonal matrices", (With S.-G. Lee and H.G. Seol), INTERNATIONAL J. PURE AND APPL. MATH., 5(2003) 315-321.
90. "Properties of 2-primitive tournament digraphs", (with Cora Neal) CONGRESSUS NUMERANTIUM, 163(2004) 33-40.
91. "A Note on the Distribution of Cycles in Random  $r$ -Regular Directed Graphs", (with Cora Neal) CONGRESSUS NUMERANTIUM, 163(2004) 141-143.
92. "Linear Transformations Preserving the Grassmannian over  $M_n(\mathbb{Z}^+)$ ", (with Alexander Guterman, Sang-Gu Lee and Seok-Zun Song), LIN. ALG. & APPL., 393(2004) 39-46.
93. "Fuzzy implicative  $LI$ -ideals in lattice implication algebras", (With Gi-Sang Cheon, Young-Bae Jun, and Seok-Zun Song), SCIENTICIAE MATHEMATICAE JAPONICAE, 9(2003) 281-292.
94. LP-problems for rank inequalities over semirings: term rank and zero-term rank. (Russian), (with Alexander Guterman and Su-Cheol Yi), FUNDAM. PRIKL. MAT. **10** (2004), no. 2, 3--21.
95. "Zero-term rank of real matrices and their preservers", (with Young-Bae Jun, and Seok-Zun Song), CZECH. MATHEMATICAL JOURNAL, 54(129)(2004), 183-188.
96. "Rank and perimeter preservers of Boolean rank-1 matrices. (With Gi-Sang Cheon, Young-Bae Jun, and Seok-Zun Song), J. KOREAN MATH. SOC., 41(2004) 397-406.
97. "Rank inequalities over semirings" (with Alexander Guterman), ), J. KOREAN MATH SOC., **42**(2005) 223-241.
98. "Linear preservers of extremes of rank inequalities over semirings, the Factor rank", (with Alexander Guterman), J. OF MATHEMATICAL SCIENCES, **131**(2005)#5 5919-5938.
99. "Linear preservers of zeros on matrix polynomials", (with Alexander Guterman, Sang-Gu Lee and Seok-Zun Song), LIN. ALG. & APPL., 401(2005) 325-340.
100. "Triangular normed fuzzification of implicative filters in lattice implication algebras", (With Gi-Sang Cheon, Young-Bae Jun, and Seok-Zun Song) , KYUNGPOOK MATHEMATICAL JOURNAL, **45**(2005)177-189.
101. "Frobenius and Dieudonne Theorems over semirings", (with Alexander Guterman, Sang-Gu Lee and Seok-Zun Song), LIN. & MULTILIN. ALG. **55**(2007) 19-34.
102. "( $a, \beta$ )-Fuzzy subalgebras in lattice implication algebras". (With Gi-Sang Cheon, Young-Bae Jun, and Seok-Zun Song), SCIENTIAE MATHEMATICAE JAPONICAE Online, **e-2004**(2004) 91-100.
103. "Column ranks and their preservers over nonnegative real matrices", (with Kyung-Tae Kang, Seok-Zun Song and Bhaba Kumar Sarma), LIN. ALG. & APPL, **399**(2005)3-16.
104. "Tournaments, primitivity and preservers", Congressus Numerantium, **170**(2004)97-105.
105. "Idempotent matrix preservers over Boolean algebras", ", (with Kyung-Tae Kang and Seok-Zun Song), J. Korean Math Soc, **44**(2007) 169-178.
106. "Linear preservers of extremes of rank inequalities over semirings, Row and column ranks", (with Alexander Guterman, Young-Bae Jun and Seok-Zun Song), LIN. ALG. & APPL, **413**(2006)495-509.



PUBLICATIONS

Refereed Scholarly Papers/Articles containing original results:

107. “LP-problems for rank inequalities over semirings: factorization rank”. (Russian)(with Alexander Guterman), SOVREM. MAT. PRILOZH.ALGEBRA No. 13, (2004), 53—70.
108. “Linear preservers of extremes of rank inequalities over semirings, Term rank and zero term rank”, (with Alexander Guterman and Sucheol Yi), J. OF MATH.SCI., **137#4**(2006)5179-5191.
109. “The Random Signals Satisfying the Properties of the Gaussian White Noise”, (with Byung Soo Moon), J. of KOREAN SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS, **9**(2005) 9-16.
110. “On cycle and bi-cycle extendability in chordal and chordal bipartite graphs”, (with David E. Brown, CONGRESSUS NUMERANTIUM. **174**(2005)41-47.
111. “Linear operators preserving perimeters of undirected graphs” (with K.-T. Kang), CONGRESSUS NUMERANTIUM, 186(2007) 129-134.
112. "Regular Matrices and Their Strong Preservers over Semirings", (with K.-T. Kang, S.-Z.Song and N.-S. Sze), LIN. ALG. & APPL. 429 (2008), no. 1, 209—223.
113. “The characterization of operators preserving primitivity for matrix k- tuples” (with Alexander Guterman), LIN. ALG. & APPL **430** (2009) pp. 1762-1777
114. “A q-analogue of the generalized factorial numbers”. (With Gi-Sang Cheon, Young-Bae Jun, and Seok-Zun Song), J. KOREAN MATH.SOC., **47**(2010) 645-657.
115. “Idempotent Boolean matrices and majorization”, (with with Alexander Guterman, Kyung-Tae Kang and Seok-Zun Song), J. OF MATHEMATICAL SCIENCES. 152(2008) 456-468.
116. “Linear operators that preserve perimeters of matrices over semirings”, (With Kyung-Tae Kang and Seok-Zun Song), J. KOREAN MATH SOC., 49(2009) 113-123.
117. “Perimeter preserving linear operators”, ( With Kyung-Tae Kang and Seok-Zun Song), CONGRESSUS NUMERANTIUM, 190(2008) 207-220.
118. “Primitivity preservers for matrix pairs” (with Alexander Guterman), MATRIX METHODS: THEORY, ALGORITHMS AND APPLICATIONS Dedicated to the Memory of Gene Golub, World Scientific, (2010) 2-19.
119. “Preserving regular tournaments and term rank-1” (with D. Brown and A. Guterman) , LIN. ALG. & APPL. 431(2009) 926-936.
120. “Extending partial tournaments: (with D. E. Brown and K. B. Reid), MATHEMATICAL AND COMPUTER MODELING, 50(2009) 287-291.
121. “Real rank versus nonnegative rank” (with T. J. Laffey), LIN. ALG. & APPL. 431 (2009), no. 12, 2330--2335
122. “Idempotent Boolean matrices and majorization” (Russian), (with with Alexander Guterman, Kyung-Tae Kang and Seok-Zun Song), FUNDAM. PRIKL. MAT., **13**(2007) 11-29.
123. “Embedding tournaments”, (with D. E. Brown). CONGRESSUS NUMERANTIUM,198 (2009), 207—210.
124. “Cycle Extendability in Graphs and Digraphs”, (with David E. Brown), LIN. ALG. & APPL, 435(2011) 1513-1519.

PUBLICATIONS

Refereed Scholarly Papers/Articles containing original results:

125. "Linear preservers of term ranks of matrices over semirings", (with Kyung-Tae Kang, Seok-Zun Song), LIN. ALG. & APPL. 436(2012) 1850-1862.
126. "Preservers of Term Ranks of Symmetric Matrices", (with Seok-Zun Song and Kyung-Tae Kang), LIN. ALG. & APPL, 436(2012) 1727-1738
127. "A Comparison of Term Ranks of Symmetric Matrices and their Preservers", (with, Seok-Zun Song and Kyung-Tae Kang), LIN. ALG. & APPL, **438**(2013)3745-3754.
128. "Preservers of sets of undirected graphs" CONGRESSUS NUMERANTIUM, 208(2011) 55-63.
129. "Preservers of cover numbers and independence numbers of undirected graphs." J. COMBIN. MATH. COMBIN. COMPUT., 86(2013), 199–214.
130. "Linear transformations that preserve term rank between different matrix spaces". (with Seok-Zun Song) J. KOREAN MATH. SOC. 50 (2013) 127–136.
131. "Linear operators that preserve term rank of matrices over semirings", (with Seok-Zun Song), BULL. MALAYS. MATH. SCI. SOC. (2) 37(2014) 719-725.
132. "Isolation number versus Boolean rank", LIN. ALG. & APPL, 436(2012) 3469-3474.
133. "Linear operators that preserve Boolean rank of Boolean matrices. CZECHOSLOVAK MATH. J. 63(138) (2013), no. 2, 435–440.
134. "Extreme preservers of term rank inequalities over nonbinary Boolean algebra", (with Seong-Hee Heo, and Seok-Zun Song) , J. KOREAN MATH. SOC., **51** (2014), No. 1, pp. 113–123.
135. "k-primitivity of digraphs" (with Sarah Mousley), LIN. ALG. & APPL, 449 (2014) 512–519.
136. "k-primitivity of binary matrices and digraphs" (with Sarah Mousley). CONGRESSUS NUMERANTIUM, 218(2013) 117–133.
137. "The arctic rank of Boolean matrices", (with A. E. Guterman and Y. N. Shitov), Journal of Algebra 433(2015) 168-182.
138. "Characterizations of Boolean rank preservers over Boolean matrices", (with, Seok-Zun Song and Kyung-Tae Kang), J. KOREAN SOC. MATH. EDUC. SER. B: PURE AND APPL. MATH., 21(2) (2014) 121-128.
139. "A characterization of linear operators that preserve isolation numbers" (with Seok-Zun Song) . MATH. COMMUN. 19 (2014), no. 2, 363–373.
140. "Linear operators that preserve graphical properties of matrices: Isolation numbers", (with, Seok-Zun Song and Young-Bae Jun), \ Czechoslovak Math. J. , 64 (139) (2014), 819–826
141. "Linear preservers of Boolean rank between different matrix spaces:, (with Seok-Zun Song and Kyung-Tae Kang), J. Korean Math. Soc. **52** (2015), 625-636.
142. "Nonnegative integer matrices having generalized inverses", (with Kyung-Tae Kang, Seok-Zun Song, and Luis Hernandez Encinas), COMMUN. KOREAN MATH. SOC., 29(2014) No. 2, 227-237.
143. "Characterization of zero term rank preservers of matrices over semirings", (with Seok-Zun Song, Kyung-Tae Kang and Luis Hernandez Encinas)) , KYUNGPOOK Math. J. 54(2014), 619-627

PUBLICATIONS

Refereed Scholarly Papers/Articles containing original results:

144. "Linear operators that preserve sets of primitive matrices", (with Seok-Zun Song and Kyung-Tae Kang), J. KOREAN SOC., 51(2014) 773-789.
145. "Preservers of Upper Ideals of Matrices: Tournaments; Primitivity", To appear in J. COMBIN. MATH. COMBIN. COMPUT.
146. "Linear Operators on Graphs which Preserve the Dot-Product Dimension", (with Sean Bailey), To appear in JCMCC
147. "Primitive exponent preservers", (with Seok-Zun Song), LIN. ALG. & APP. 491 (2016) 263–275.
148. "Zero-term rank and zero-star cover numbers of symmetric matrices and their preservers", (With S.-Z. Song) submitted to LaMA by Song.
149. "Preservers of completely positive matrix rank". (with Preeti Mohindru, Rajesh Pereira and Seok-Zun Song). To appear in LaMA Accepted 08/11/2015
150. "Linear operators on graphs that preserve the clique cover number", (with David E. Brown, submitted to Congressus.
151. "Preservers of completely positive matrix rank for inclines". (with Preeti Mohindru and Rajesh Pereira). Submitted to LAA 08/04/2015
152. "Primitive symmetric matrices and their preservers". (with Seok-Zun Song) Submitted to LAA by Song)
153. "Preservers of Term Ranks and Star Cover Numbers of Symmetric Matrices", submitted to LAA

LeRoy B. Beasley

Page 12 of 15

PUBLICATIONS:

Others (Expository Papers, Conference Proceedings, etc.):

1. "The 1983 Utah State University Department of Mathematics Conference, June 9, 10, & 11, 1983. Logan, Utah", (with E.E. Underwood), LIN. ALG. AND ITS APPL. 59,(1984) 183-211.
2. "The mathematical work of Joel Lee Brenner", LIN. ALG. AND ITS APPL. 90(1987) 1-14. (A biography of J.L. Brenner requested by the editors) . **MR**: 88b: 01044.
3. "The 1987 Utah State University Department of Mathematics Conference, 29, 30 and 31 January 1987, Logan, Utah", (with E.E. Underwood), LIN. ALG. and ITS APPL 104(1988)165-249.
4. "Linear operators on matrices", (with N.J. Pullman), LIN. ALG. and ITS APPL. 120(1989) 142-144.
5. "Miscellaneous Preserver Problems", (with C.-K. Li and S. Pierce), Chapter 9 of "Linear preservers" LINEAR AND MULTILINEAR ALGEBRA, 33 (1992) 109-119. **MR**: 1 346 786.
6. "Review of *Linear Algebra and Its Applications* Volumes 1 and 2, by D.H. Griffel", (with D.A.S. Beasley), LIN. ALG. AND ITS APPL., 165(1992) 269-70.
7. "Linear operators strongly preserving multivariate majorization", (with S.G. Lee), PROCEEDINGS OF THE PRAGUE MATHEMATICAL CONFERENCE 1996, 19--22, Icaris, Prague, 199?. 15A04 (15A21) . **MR**: 1 703 450.
8. "A Characterization of Strong Preservers on Multivariate Majorization", (with S.G. Lee), PROC. OF INHA SYMPOSIUM ON PURE AND APPL. MATH., June , pp.17-30 (1997)
9. "Norman J. Pullman, 1931-1999", Proceedings of the Memorial Session of CGTC31, March 2000, UtahStateUniversity, Logan, UT.
10. "Norman J. Pullman, 1931-1999", CONGRESSUS NUMERANTIUM, 146(2000) 5-13.
11. "Majorization of Matrices", Encyclopedia of Statistical sciences, 2<sup>nd</sup> E., S. Kotz and C. Read Eds. (Requested by the editors).
12. "Linear Preserver Problems and their Solutions", Lecture Note Series TP1001, (South Korean) National Institute for Mathematical Sciences, 2010.
13. "The Theory of Linear Algebra", Text for Math 5340, Utah State University, 2011
14. "Communication Complexity, Linear optimization, and lower bounds for the nonnegative rank of matrices", (with Hartmut Klauk, Troy Lee, and Dirk Oliver Theis) Dagstuhl Reports, **MR**(2013) Is. 2 126-142.

LeRoy B. Beasley

Page 13 of 15

**GRANTS/AWARDS/HONORS AND PROFESSIONAL ACTIVITIES:  
GRANTS, AWARDS, etc.**

NSF Grant #MCS790042 - 1979-1980

USU Faculty Mini-Grant - 1982, 1983, 1984, 1989

Invited participant NSF-CBMS Regional conference on Structural Matrix Theory, August 1991, Atlanta, GA, (\$500 Award)

Invited participant in the Institute of Mathematics and its Applications, special year in Linear Algebra, Fall Quarter, 1991, Univ. of Minnesota, Minneapolis. (\$1500 Award).

USU Math Department Researcher of the Year, 1989, 1991.

Named International Cooperative Researcher on \$12,000 Grant from the Ministry of Education, Korea 1993.

Faculty of Science, University of Lisbon (FACC, JNICT Grant) 100,000\$00 (~\$700 US), Feb-Apr 1995.

Biographies in: Who's Who in the World; Who's Who in America; American Men and Women of Science; Who's Who in the West; Who's Who in Frontiers of Science and Technology; Who's Who in Education, Who's Who in Sciences Higher Education, Who's Who in Science and Technology

Korean Research Foundation grant, 2003-2006, 76,800,000 S. Korean Won (approx. \$65,000) per year. Co Pi's :LeRoy B. Beasley, Gi-Sang Cheon, Young-Bae Jun, and Seok-Zun Song.

**PROFESSIONAL MEMBERSHIPS:**

Irish Math. Society

Korean Math. Society

International Linear Algebra Society

Institute of Combinatorics and its Applications (Fellow).

**PROFESSIONAL ACTIVITIES:**

Summer Research Associate at Univ. of Waterloo, Ontario, Canada - 1972, 1973, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986

Summer Research Associate at Wilfred Laurier Univ., Canada - 1978, 1980, 1983

Summer Research Associate at Queens Univ., Canada - 1981, 1983, 1985, 1986, 1990

Co-organizer of the USU Mathematics Department Conf., June 1983

Co-organizer of the USU Mathematics Department Conf., January 1987

LeRoy B. Beasley

Page 14 of 15

GRANTS/AWARDS/HONORS AND PROFESSIONAL ACTIVITIES:

Co-organizer of the 1994 Southern California Matrix Conference, held in Salt Lake City, November 1994

Co-organizer of the USU Math Dept Conf. May 1996

Organizer of the 1999 USU Mathematics and Statistics Department Miniconference, May 1999

Organizer of a special session of the 31<sup>st</sup> Southeastern International Conference on Combinatorics, Graph Theory and Computing at Boca Raton Florida, on March 13-18, 2000. This special session was in memory of Norman J. Pullman, my coauthor 23 times.

Co-Program Organizer for the International Algebraic Conference at MoscowStateUniversity, Moscow, Russia, held June 2004.

Refereed Grant Proposals for:

National Science Foundation

Natural Science and Engineering Research Council of Canada

National Research Council of the NSA

Austrian Science Fund (Lise Meitner Postdoctoral Research Position) 2007

Refereed Papers for:

Linear Algebra and its Applications

Linear and Multilinear Algebra

American Mathematical Monthly

Transactions of IEEE

Information Science

SIAM Journal on Algebraic and Discrete Methods

Caribbean Journal of Mathematics

Journal of Chemical Information and Computer Sciences

Fuzzy Sets and Systems

Equationes Mathematicae

Proceedings of the AMS

SIAM Journal on Matrix Analysis and Applications

Graphs and Matrices

Current Trends in Matrix Theory

Houston Journal of Mathematics

Discrete Applied Mathematics

Publicationes Mathematicae Debrecen

Discrete Mathematics

Discussiones Mathematicae –General Algebra and Applications Inter University Services:

Rocky Mountain Mathematical Journal

Pacific Journal of Mathematics

Applied Mathematics Letters

Journal of the Korean Society of Mathematical Education Series B

LeRoy B. Beasley

Page 15 of 15

GRANTS/AWARDS/HONORS AND PROFESSIONAL ACTIVITIES:

Georgian Math Journal

Czech Mathematics Journal

Journal of Applied Mathematics & Computing (JAMC)

International Journal of Pure and Applied Mathematics

Computing and Mathematics

Ars Combinatoria

Publicationes Mathematicae Debrecen

Graphs and Combinatorics

Bulletin of the Malaysian Mathematical Sciences Society

Electronic Journal of Linear Algebra

Journal of the Korean Mathematical Society

Mathematical Communications

European Journal of Combinatorics

Annales Polonici Mathematici

Miskolc Mathematical Notes

Bulletin of the Iranian Mathematical Society

FILOMAT

Other refereeing:

Outside Referee for the tenure and promotion of Carolyn Eschenbach, Department of Math, Georgia Tech University, 1991-2.

Outside Referee for the promotion to Full Professor of Yueh-Er Kuo, Department of Math, University of Tennessee, 1992-3.

Outside Referee for tenure and promotion of Valorie Miller, Dept. Of Math, Georgia Tech 1996-7.

Outside Referee for the promotion to Full Professor of Thomas Porter, Department of Math, Southern Illinois University.

Outside Referee for the promotion to Associate Professor of Wei-Liang Chooi University of Malaya.

Committee services of Professional Organizations:

Chairman of the Corporate Membership Committee of I.L.A.S. (International Linear Algebra Society) 1992-1994.

Reviewer for the A.M.S. Math Reviews 2006-pres

Evaluation panel for the selection of research proposals to be funded by the Fundação para Ciência e a Tecnologia (the Portuguese National Science Foundation), Lisbon Portugal, January 2007. This evaluation team consisted of 6 members from 5 countries and was responsible for the funding of 20 of 58 grant proposals (mostly 3 year proposals) in all areas of mathematics and statistics. A total of 1 million Euros (US\$1.3 million) were dispensed.

Chair of the evaluation panel for the selection of research proposals to be funded by the Fundação para Ciência e a Tecnologia (the Portuguese National Science Foundation), Lisbon Portugal, January 2010. This evaluation team was responsible for the funding of 4 of 5 grant proposals (mostly 3 year proposals) in all areas of mathematics and statistics. A total of 1 million Euros (US\$1.3 million) were dispensed.

Co-organizer of seminar #13082 of the Schloss Dagstuhl, Saarbrucken, Germany, held February 2013.