

An Entertainment for Your Spare Moments

- What is Ludolf's Number?
- Which of the following poker hands is best? Which is the worst? Which are of equal strength? The game is being played with an ordinary 52-card deck. No wild cards are being used.
 - $A\spadesuit A\heartsuit A\diamondsuit K\clubsuit K\heartsuit$
 - $A\spadesuit A\heartsuit A\diamondsuit Q\clubsuit Q\spadesuit$
 - $A\spadesuit A\heartsuit A\diamondsuit Q\clubsuit Q\heartsuit$
 - $A\spadesuit A\heartsuit A\diamondsuit 6\clubsuit 6\spadesuit$
 - $A\spadesuit A\heartsuit A\diamondsuit 3\clubsuit 3\spadesuit$
- What is the largest n -digit number that is also an exact n th power?
- Find two unequal numbers, A and B , such that $A + n$ is a factor of $B + n \quad \forall n \in \{0, 1, 2, \dots, 10\}$
- What are the first 5 perfect numbers?
- The period of the reciprocal of 3 is 1: $\frac{1}{3} = 0.33\overline{3}$.
The period of the reciprocal of 27 is 3: $\frac{1}{27} = 0.03703\overline{7}$.
What is the smallest prime, p , the period of whose reciprocal is $\frac{1}{2}(p-1)$?
- Find the largest group of different positive integers less than 100 such that no combination of them adds up to 100.
- For what value of x is $x^{\frac{1}{x}}$ a maximum?
- 7 letters are written to 7 different addresses, and 7 matching envelopes are prepared. In how many ways can the letters be placed in the envelopes so that every letter is in the wrong envelope?
- As the number of letters and envelopes in Problem 9 increases without bound, what is the probability that every letter will be placed in the wrong envelope?
- What is the base of Brigg's logarithms?
- What is the only number between 2 and 200,000,000,000,000 that is a perfect square, cube, and fifth power?
- Find a number, N , which has the following characteristics:
 - N^{13} has the same last digit as N .
 - The sum of the digits of N^{13} is equal to the sum of the digits of N^{31} .
 - $N^{13} - N$ is divisible by 13.

Solutions available after lunch on Saturday



Washington Community College Mathematics Conference at Alderbrook Spring



1990

5,6,7

Thursday Evening 7 pm	Bruce Ransom "Sleazy True or False. (An Apology)"	(A video presentation will follow the talk in the Eastwood room)				
Friday Morning Session I 9 - 9:50 am	Larry & Holly Runyan "A Precalculus Response to the Changing Calculus"	James H. Jordan "Petite Integer Polygons"	David R. Anderson "Graphing Functions of Two Variables"			
9:50 - 10:20 B	R	E	A	K		
Friday Morning Session II 10:20 - 11:10	Allen J. Mauney "Chaos in the Classroom" Tyre Newton & Scott Cardell "New Views of Mandelbrot and Julia"	Keith Harrington "ISSAC: A Computer Program to Demonstrate Vector Analysis in 2 & 3 Dimensions"	Gail Nord "Continued Fractions"			
12 - 1 pm L	U	N	C	H		
Friday Afternoon Session I 1:30 - 2:20 pm	Bob Hughes "Staying Afloat in the Third Wave"	Dr. Stephen Hinthorne "Combinatorics and Incidence Structures"	Steven Kant "Learning Disabilities: Fact or Fiction"	Donald R. Chalice Beth Wood "Escher's Tilings of the Plane"		
Friday Afternoon Session II 2:30 - 3:20 pm	Ron Larson "Calculus: The Past 30 Years, the Next 10 Years"	David Mitchell "Panel: Exploring the Interest In & Need For a Puget Sound Mathematics Consortium"	Frank Edge & Steven Kant "Flip Chip Algebra"	Duane W. DeTemple "From Here to Infinity"		
3:20 - 3:40 B	R	E	A	K		
Friday Afternoon Session III 3:40 - 4:30 pm	Joe Mailhot "Musically Applied Mathematics"	Victor Bloomfield "The Mathematics of Two Presidents, a General, and a Poet" Andre Yandl "On the Greatest Integer Function"	Nancy Wadlington & Bob Brewer "The Square Finder" John Reay "Paper Folding to Get Dragon Curves"	Ken Gannon Various Student Papers		
4:45 - 5:45	WAMATYC Meeting					
6:45 pm B	A	N	Q	U	E	T

	Eastwood	Captains	Loft	Hamma-Hamma
Saturday Morning 7:30 - 8:30 am	Breakfast		Buffet	
Saturday Morning Session I 9 - 9:50 am	Dr. Carl Swenson "The Glory & Glitches of <i>Mathematica</i> "	Yves Nievergelt "What Happened to Geometry on the Way to Calculus?"	Philip A. Heft "A Mathematical Model of a Forest Fire"	Chris Meyer "A History of II"
10 - 10:30 am B	R	E	A	K
Saturday Morning Session II 10:30 - 11:20	Doug Mooers "Mathematical Tour of England"	David Chalif "Panel: Mathematics in Context"	Richard Levin "Some Interesting Applications of Linear Algebra in Numerical Solutions of the Heat Equation, $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ "	Dorothy M. Crepin "Some Familiar Topics Revisited: Homework, Testing, and Participation"
12 - 1 pm L	U	N	C	H

SCHEDULE

THURSDAY

4 pm Registration Begins

7 pm Talk Movies Hospitality Center Open

FRIDAY

7:30 - 8:30 am Breakfast Buffet

9:00 - 9:50 am Morning Session I

9:50 - 10:20 am Break

10:20 - 11:10 am Morning Session II

12:00 - 1:00 pm LUNCH

1:30 - 2:20 pm Afternoon Session I

2:30 - 3:20 pm Afternoon Session II

3:20 - 3:40 pm Break

3:40 - 4:30 pm Afternoon Session III

4:45 - 5:45 pm Annual WAMATYC meeting

6:45 pm BANQUET
Hospitality Center Open

SATURDAY

7:30 - 8:30 am Breakfast Buffet

9:00 - 9:50 am Morning Session I

10:00 - 10:30 am Break

10:30 - 11:20 am Morning Session II

12:00 - 1:00 pm LUNCH

Sleazy True or False. (An Apology)

Bruce Ransom
Clark College

Eastwood
Thursday 7 pm

T F 1. For $n \in \mathbb{N}$, $n^{-1} - (n+1)^{-1} = [n(n+1)]^{-1}$

T F 2. If (a, -b) is in the first quadrant, then (a, b) is in the fourth quadrant.

Why would one give such true or false questions on a mathematics educational opportunity?
Come to the meeting and pick up more of these to take back to your students. There will be an attempt made to justify these questions that some students call "twisters".

A Precalculus Response to the Changing Calculus

Larry & Holly Runyan
Shoreline CC/ Woodinville High School

Eastwood
Friday 9 am

We've devised a modeling process for problem solving that makes teaching "story problems" fun. We will examine some ideas & examples of Precalculus problem solving that are motivational and workable.

Petite Integer Polygons

James H. Jordan
Washington State University

Captains
Friday 9 am

Integer Polygons are polygons with all sides and all diagonals having integer length. "Smallest" ones for triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons, ... will be shown.

Graphing Functions of Two Variables

David R. Anderson
Central Washington University

Loft
Friday 9 am

Functions are investigated with a computer (Macintosh/Microsoft Excel) and calculus concepts (total derivative) are discussed.

Chaos in the Classroom

Allen J. Mauney
Western Washington University

Eastwood
Friday 10:20 am

Dynamical systems and "chaos" provide many opportunities for students on all levels to do and see modern mathematics. Examples and suggested materials offered.

ISSAC: A Computer Program to Demonstrate Vector Analysis in 2 & 3 Dimensions.

Keith Harrington
Peninsula College

Captains
Friday 10:20 am

The presentation will consist of a demonstration of the graphic display of 2 & 3 dimensional functions, along with their 1st & 2nd order partial derivatives, gradient, divergence, and curl.

Continued Fractions

Gail Nord
Gonzaga University

Loft
Friday 10:20 am

I will give examples of continued fractions and some properties of some interest. I will show how continued fractions can be used in a number theory course. (There will be handouts for the participants.)

New Views of Mandelbrot and Julia. (A Preliminary Report)

Tyre Newton & Scott Cardell
Washington State University

Eastwood
Friday 10:50 am

Presenting a simple program in BASIC for a four dimensional iteration for which two of the six two dimensional subspaces yield the Mandelbrot and Julia sets, respectively. The resulting color graphics obtained using the PC will help students to visualize four dimensional space in terms of its various subspaces. This program is being developed for a study of nonverbal recognition techniques in experimental psychology.

Staying Afloat in the Third Wave ... A Business Executive's View of Emerging Educational Technology

Bob Hughes
The Boeing Company

Eastwood
Friday 1:30 pm

Bob Hughes, an executive with The Boeing Company in Seattle Washington and a local school board member, will provide an informative and entertaining overview of technology with particular emphasis on new and emerging educational tools for all types of learners. Besides demonstrating many of the more current classroom technologies (i.e., computer based learning systems, laser disc storage media, distance learning, compact discs applications, etc.), participants will leave with a much clearer appreciation for state-of-the-art classroom trends, what vendors are offering and what teachers across the nation are finding effective.

Combinations and Incidence Structures - An Elementary Counting Technique

Dr. Stephen Hinthorne
Central Washington University

Captains
Friday 1:30 pm

An elementary presentation of counting techniques applied to finite incidence structures such as finite projective planes and biplanes and their residual structures.

Learning Disabilities: Fact or Fiction?

Steven Kant
South Puget Sound College

Loft
Friday 1:30 pm

A critical view of the idea that many students have math learning disabilities. Instead, I will discuss educational reasons for difficulties & some suggestions for solving the problems.

What is a Fractal?

Donald R. Chalice
Western Washington University

Hamma Hamma
Friday 1:30 pm

A definition of a self-similar fractal is presented. Certain fractal-like sets are examined. For example, there is a connected fractal-like set S in the plane such that when a certain point p (the "Explosion Point") is removed from it, then the set S-p contains no connected subsets other than single points. Various methods of generating fractals are presented and examined.

Escher's Tilings of the Plane

Beth Wood
Western Washington University

Hamma-Hamma
Friday 1:55 pm

How did Escher develop his tilings of the plane, and how can you do the same. Includes introduction to regular tilings of the plane

Calculus: The Past 30 Years, the Next 10 Years

Ron Larson
Penn State-Behrend

Eastwood
Friday 2:30 pm

A discussion of where the calculus has been and what changes are incorporated in the new leaner calculus.

Exploring the Interest In & Need For a Puget Sound Mathematics Consortium

David Mitchell
North Seattle Community College

Captains
Friday 2:30 pm

Recently several developments in lower division mathematics curriculum have occurred both locally and nationally. These developments include significant curriculum revisions and changes in instructional pedagogy. The goals of lower division mathematics curriculum and instructional strategies designed to obtain such goals have become the topics of lively discussions on all of our campuses.

By nature of our geographic proximity, such discussions often include each other's college. Students move between our institutions, so we necessarily need information about math curriculum other than our own when we make decisions which can have an effect on the transferring student.

The purpose of this session will be to solicit input on whether a forum to review and discuss lower division math curriculum and transfer issues should be established. This session will examine the interest in and need for a region wide group of some type that would serve as a way to communicate common concerns about curriculum and transfer issues. The University of Washington has expressed an interest in organizing such a region-wide group. I know that engineering has had such a structure for many years (Washington Consortium for Engineering and Related Technologies Education). WCERTE and NETWORK have functioned very well by all accounts.

This session will be conducted by a panel of representatives from two-year colleges and four-year universities. Other members of the panel:

Caspar Curjel - U of W, Larry Curnutt - Bellevue CC, Carl E. Swenson - Seattle U

Flip Chip Algebra: A New Manipulative Based Text for Beginning Algebra

Frank Edge & Steven Kant
South Puget Sound Community College

Loft
Friday 2:30 pm

We will introduce instructors to the methods of our new text book which allows students to touch and see the symbols and operations of algebra, from signed numbers through completing the square

From Here to Infinity: Estimating the Partial Sums of the Harmonic Series

Duane W. DeTemple
Washington State University

Hamma-Hamma
Friday 2:30 pm

It is well known that $S_n = 1 + \frac{1}{2} + \dots + \frac{1}{n}$ increases with n to infinity, but how long does it take to get there? Here is how to answer the following problem: given A , $A > 0$, what is the smallest integer n_A for which $S_{n_A} > A$?

Musically Applied Mathematics: Mathematically Inspired Music and Its Composition

Joe Mailhot
St. Martin's College

Eastwood
Friday 3:40 pm

I will present several mathematically inspired compositions and discuss the various methods I have used in composing these pieces, as well as other methods of using mathematics in composition.

The Mathematics of Two Presidents, a General, and a Poet

Victor E. Bloomfield
Western Washington University

Captains
Friday 3:40 pm

What do Napoleon, Henry Wadsworth Longfellow, and Presidents Garfield and Jefferson have in common? They love math! Some of their favorite problems from algebra and geometry will be presented.

- The Square Finder

Nancy Wadlington (Spears) & Bob Brewer
Everett Community College

Loft
Friday 3:40 pm

This is an alternate solution to the classic geometry problem of locating a square in a triangle. This solution was developed by a student in my geometry class.

Various Student Papers From Math 498

Ken Gamon
Central Washington University

Hamma-Hamma
Friday 3:40 pm

Contour Integration as a Tool for Building a Table of Definite Integrals -- Eric Welch

An Interesting Problem from the 1989 Putnam Exam -- Dale Cole

A Theorem from Differential Geometry Made Easy -- Scott McDonald

A Solution to a Problem from the College Math Journal -- Paul Gamon

On the Greatest Integer Function

Andre Yandl
Seattle University

Captains
Friday 4:05 pm

Most calculus textbooks introduce the greatest integer function as an example of a non-continuous function and to illustrate the notion of one-sided limits. However, very little use is made of that functions. We give some examples that can generate good classroom discussions. For example, suppose s_n is a sequence of positive integers and A , B are any two distinct real numbers. Generate another sequence whose first s_1 terms are A , whose next s_2 terms are B , next s_3 terms are A , next s_4 terms are B , and so on.

Paper Folding to get Dragon Curves

John Reay
Western Washington University

Loft
Friday 4:05 pm

There is a close relationship between various ways to represent numbers in different bases, and the "curve" you get by folding a long strip of paper many times, and the opening it so all folds are 90°

The Glory and Glitches of *Mathematica*

Dr. Carl Swenson
Seattle University

Eastwood
Saturday 9:00 am

A demonstration of the *Mathematica* system.

What Happened to Geometry on the Way to Calculus?

Yves Nievergelt
Eastern Washington University

Captains
Saturday 9:00 am

In a calculus class, even well prepared students are perplexed if a problem calls for a modicum of geometric reasoning. We offer suggestions on how to cope with students' lack of geometry. Topics include the 3D geometry behind computer graphics.

A Mathematical Model of a Forest Fire

Philip A. Heff
Green River College

Loft
Saturday 9:00 am

The Forest Service has instrumentation that enables the calculation of fire intensity as a function of time from empirical data. Models were developed that predict quite well the behavior given a few initial conditions.

A History of π

Chris Meyer
Pacific Lutheran University

Hanna-Hanna
Saturday 9:00 am

I will talk about our understanding of π from the ancient Egyptians up to the twentieth century.

Mathematical Tour of England

Doug Mooers
Whatcom Community College

Eastwood
Saturday 10:30 am

Overview of Mathematical Tour of England. Material about Universities, Schools, and Sites visited; video highlights include: Rhind papyrus, Rosetta Stone, Wren Churches, London, Stonehenge

Mathematics in Context: Three Learning Community Models

David Chalif
Edmonds Community College

Captains
Saturday 10:30 am

David Chalif and Mary O'Brien from Edmonds CC, Janet P. Ray for Seattle Central CC, and Suzanne Butschun from Tacoma CC: Three different approaches to integrating mathematics and its applications will be discussed by the panelists -- integrating precalculus and calculus, intermediate algebra and chemistry, and precalculus/calculus with economics.

Some Interesting Applications of Linear Algebra in Numerical Solutions of the Heat Equations, $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$.
Richard Levin
Western Washington University

Loft
Saturday 10:30 am

Certain approximations of the partial derivatives, $\frac{\partial u}{\partial t}$ and $\frac{\partial^2 u}{\partial x^2}$ result in the need to solve systems of equations, $Ax = b$, where A is fixed but b changes. We want to find efficient ways to solve such systems and also to determine whether the methods are stable relative to error propagation. This requires an investigation of the eigenvalues of the matrix A .
Note: Details will be kept to a minimum.

Some Familiar Topics Revisited: Homework, Testing, and Class Participation.

Dorothy M. Crepin
Clark College

Hanna-Hanna
Saturday 10:30 am

1. Should homework be assigned? Graded? Count toward final grade?
2. How much material should a test ideally cover?
3. Is it important for the students to actively participate in the class discussion.

Share your ideas.

A Very Brief History of the Washington Community College Mathematics Retreat

<u>YEAR</u>	<u>HOST</u>	<u>LOCATION</u>
1990	Clark College	Alderbrook
1989	Bellevue Community College	Lake Chelan
1988	Olympic Community College	Port Ludlow
1987	Lower Columbia College	Alderbrook
1986	North Seattle Community College	Alderbrook
1985	Shoreline Community College	Sun Mountain
1984	Green River Community College	Alderbrook
1983	Olympic Community College	Port Ludlow
1982	Highline Community College	Lake Chelan
1981	Spokane Falls Community College	Sun Mountain
1980	Spokane Falls Community College	Sun Mountain
1979	Olympic Community College	Port Ludlow
1978	Edmonds Community College	Providence Heights
1977	Shoreline Community College	Providence Heights
1976	Bellevue Community College	Snoqualmie Pass
1975	Highline Community College	Providence Heights
1974	Shoreline Community College	Lake Wilderness
1973	Seattle Central Community College	Snoqualmie Pass
1972	Everett Community College	Snoqualmie Pass
1971	Everett Community College	Snoqualmie Pass
1970	Spokane Falls Community College	The Lodge
1969	Green River Community College	The Lodge

The first Washington Community College Mathematics Retreat was held in 1969. It was organized by **Phil Hest, Larry Larson, Jim Relf, and John VanDruff**. 33 participants met at "The Lodge" at Ashford with sleeping bags. The cost was \$16.68 per person.

Bellevue CC

Marilyn Anderson
Larry Curnutt
Berthe Habib
Dale Hoffman
Nil Molvik
Rose Pugh
Peter Ratener
Laurence Ratener
David Stacey
Lynn Tooley
G. Peter Hould
Marion Miller
Lynne Sage
Marilyn Tober
Deborah Ummel
Caroline Shook

Everett CC

Lewis Winje
Nancy Spears
Larry Baxter
Susan Gardsbane
Robert Brewer

EWU

Yves Nievergelt

Gonzaga

Gail Nord
John Nord
Danie Hughes
Mrs. Danie Hughes

Green River CC

Donald Alexander
David Bender
Diana Bender
Don Hallstone
Phil Hest
Larry Larson
Laura Moore Mueller
Jay Yancey
Shana Painter

Big Bend CC

Anita Hughes
Stephen Lane
Donna Brown
Roger Murray

Boeing

Bob Hughes

Clark College

Dorothy Crepin
Robert Crepin
Louise Hoover
Dennis Watson
Tom Reifenrath
Bruce Ransom
Mike Greenwood
Adam Jackson
Wes Orser

Highline CC

Karen Frank
Torgeir Haugland
Mrs. Torgeir Haugland
Brian Hogan
Pat Hogan
Ed Morris
Ed Newell
Dick Plagge
Allan Walton
Joe Wilcox

Columbia Basin

Paul Meier
Gary Olson
Truman Tucker
Barbara Whitney

Lower Columbia

Carol Flakus
William Fuller
Diane Fuller
Martin Sherry
Lenore Vest
Gary Carroll

CWU

Stephen Hinthorne
David Anderson
Ken Gamon
Scott MacDonald
Dale Cole
Paul Gamon
Eric Welch

North Seattle CC

Barbara Poole
Don Poole
Vickey Ringen
Bob Tighe
Harry Watts
Barbara Dyer

Edmonds CC

David Chalif
Barbara Maly
Brenda Tomulty
Gerald Rosenberg
Rebecca Montgomery
Russell Davis
Mary O'Brien

Olympic College	Mike Dodge	Skagit Valley CC	Howard Anderson
	Carson Hollingsworth		Richard Huffman
	Scott Niven	South Puget Sound	Frank Edge
	Dave Sicks		Steven Kant
	Martain Haines		
	Teri Haines		
	Rhoda Gage		
	Larry Brownlee	South Seattle CC	Jerine Ridgway
			Dave Hemme
Pacific Lutheran	John Herzog	Spokane CC	
	Margaret Herzog		Susan Dimick
	Chris Meyer	Spokane Falls CC	Charles Ainley
	Celine Domer		Kialynn Glubrecht
Peninsula College	Kent Brauning		Larry Neises
	Rosemary Brauning		Nick Nickoloff
	Marjorie Lindberg		Curtis Humphrey
	Keith Harrington		Judith Hymphrey
Pierce CC	Dr. John VanDruff	St.Martin's	
	Pat Davis		Joe Mailliot
	Debbie Falcioni	Tacoma CC	Karen Clak
	Mike Lamka		Ed Zimmerman
	Tom Jepsen		Anne Hafer
	Diane Downie		Phil Green
	Sally Glover		Suzanne Butschon
Portland CC	Dick Clark		
Santa Barbara CC		U of Puget Sound	Rosemary
	Peter Georeakis		Hirschfelder
	Elisabeth Hodes		Darlene Ruble
			Barbara Price
Seattle Central CC		U of W	Frank Lyman
	Richard Benson		Heidi Lyman
	John LaCoste		
	Janet Ray	Walla Walla CC	
	Greg Langkemp		Susan Poston
Seattle U		Whatcom CC	Elizabeth Cunningham
	Mary Ehlers		Jane Shelby
	Wyrne Guy		
	Andre Yandl	Woodenville HS	
	Carl Swenson		Holly Runyan
	Janet Mills		
Shoreline CC		WSU	Jim Jordan
	Helen Hancock		Duane DeTemple
	Mark Parker		James Cochran
	Debra Miller		Kathy Cochran
	Stephen Perry		Tyre Newton
	Fred Prydz		Eleanor Newton
	Larry Runyan		Scott Cardell
	Judy Sanderman		
	Shannon Flynn		
	Sarah Leyden		

WWU

Victor Bloomfield
 Jim' L'Duemmel
 Sue Kaplan
 Rich Levin
 Barbara Levin
 Norm Lindquist
 John Reay
 Betty Reay
 Donna Rochon
 Beth Wood
 Maryann Firpo
 Allen Mauney
 Preston Gramling
 Joyce Keenan
 Don Chalice
 Heidi Weiss Green

Notes

Future Retreat Hosts

1991

Pierce Community College

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Tacoma Community College

1992

Yakima Valley Community College

1993

Highline Community College

1994

South Seattle Community College

1995

Whatcom Community College

+

Skagit Valley Community College