Sequiero COregon CC Bend, Oregon 97701
(503) 383-7725
Demana/Waits
Precalc — require gr. calc (encourage TI-81)

Send 1-3½" floppy disk for Public Domain software

Start machine with disk, so uses older system from system folder & run better!

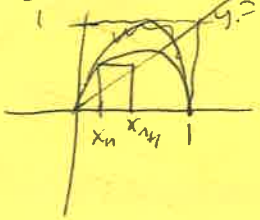
Peitgen "Fractals For the Classroom"
* Classroom activities in paperback
Companion to Peitgen
(2nd coming out "soon")

$\frac{dP}{dt} = kP$ $\frac{dP}{dt} = kP(1-P)$
(P here is % of max)

Discrete case →
$x_{n+1} = k x_n (1 - x_n)$
x_0 = proportion of max
x_0 from 0 to 1

k
birth rate
death rate
resources
etc

"Try different values x_0, k" (TI-81)



$f(x) = k x(1-x)$ parabola
$x_{n+1} = k x_n (1 - x_n)$
3.2 .2 2 stats
R x_0
3.9? Chaos, ... black!

	n	n_2	# odds
1 1	1	1	
1 2 1	2	10	$2^1 = 2$
1 3 3 1	3	11	$2^2 = 4$
	⋮		
	9	1001	$2^2 = 4$
	11	1011	$2^3 = 8$

M. Anderson BCC

1992

Washington

Community

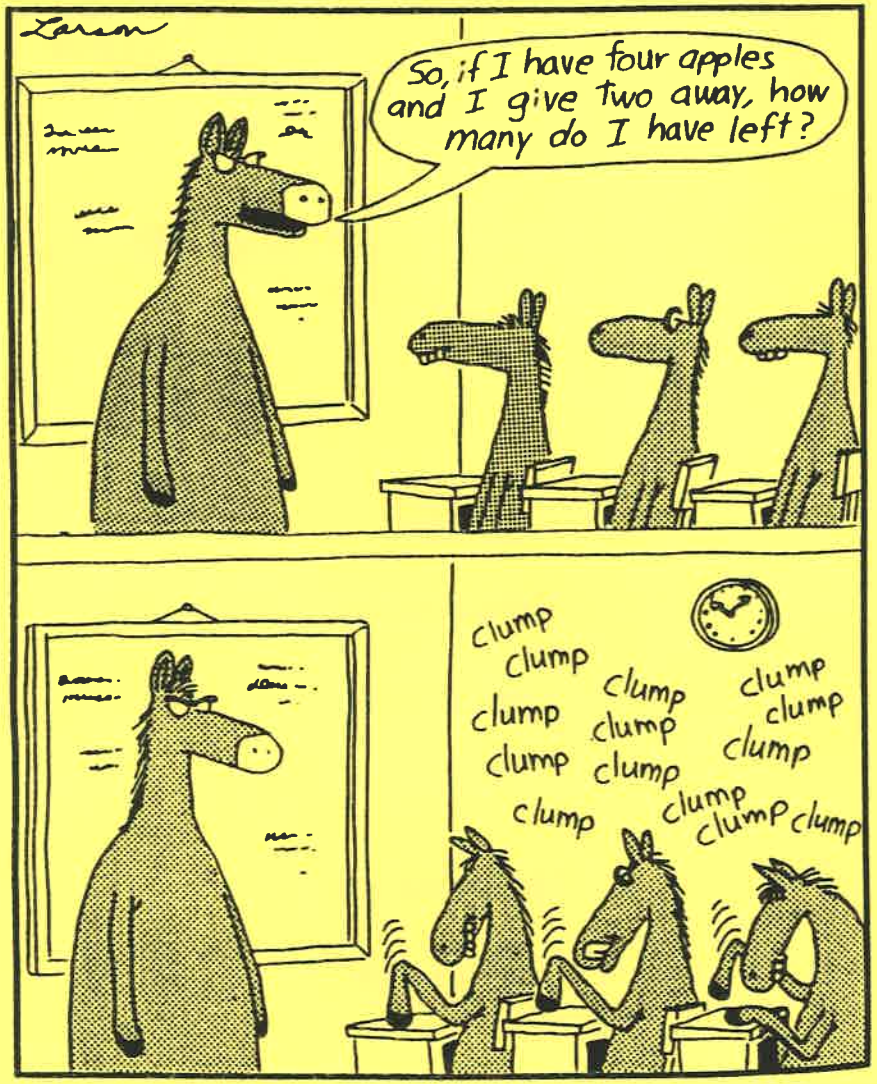
College

Mathematics

Conference

Holiday Inn
Yakima

April 9 - 11



CONTENTS

THURSDAY EVENING

3:00 - 7:00	LOBBY	REGISTRATION
7:00 - 8:00	BALLROOM ABC	*"Did you ever smoke pot in the 60's? If so, did you inhale? Getting truthful answers to sensitive questions."* Bill Owen CWU
8:00 - ???	ROOM 148	HOSPITALITY ROOM

FRIDAY MORNING

7:30 - 8:30	LAKESIDE ROOM	BREAKFAST

	BALLROOM A	BALLROOM B	BALLROOM C
9:00 - 9:25	*"From Math Anxious to Math Able - A Coordinated Studies Approach"* Karen Clark and Diane Nason TCC	*"Implicit and Explicit Teaching Changes Forced By Technology"* James H. Jordan WSU	*"Of Cashews, Macademias, C.D.'s, and Similar Mundane Things"* Chuck Millard YVCC
9:25 - 9:40			*"Spaghetti Dinners and How They Relate to Combining Fractions"* Ben Mayo YVCC
10:05 - 10:30	*"Patterns in Pascal's Triangle"* Gail Nord GU	*"Using Spreadsheets in Business Calculus"* Rosemary Hirschfelder and Barbara Price UPS	*"Testing Concepts in Calculus"* Dale Hoffman BCC
10:30 - 10:55			
11:10 - 12:00	*"Increasing Minority Participation in Math-Based Disciplines: It isn't about passing. It's about excelling."* Helen Hancock SCC	*"Fun With Metrics (Or How Far Is It, Anyway?)"* Steve Hinthorne CWU	*"Some Machinations of Leonhard Euler"* Calvin Long WSU

FRIDAY AFTERNOON

12:15 - 1:15	LAKESIDE ROOM	LUNCH

	BALLROOM A	BALLROOM B	BALLROOM C
1:30 - 2:20	*"WAMATYC - What is Going on in the State"* Mike Greenwood CC	*"My Students are THINKING: the Use of Team Projects in Calculus"* Anne Hafer TCC	*"Priority - Based Algebra: the New Algebra"* Fred W. Fischer NSCC (continued next hour)

FRIDAY AFTERNOON

	BALLROOM A	BALLROOM B	BALLROOM C
2:35 - 3:25	*Remarks on the Teaching of Mathematics"* Andre Yandl SU	*"The Many Faces of Polyhedra"* Beth Wood WCC	(cont. from previous hour) *"Priority - Based Algebra: the New Algebra"* Fred W. Fischer NSCC
3:40 - 4:05	*"A Multi-Representational Approach to Teaching Functions"* Jan Rizzuti CWU	*"Julia Sets and Programs to Generate Them"* Don Chalice and Doug Hundley WWU	*"The Geometry of Multivariable Calculus"* Caspar R. Curjel, UW, and Yves Nievergelt, EWU
4:05 - 4:30	*"Informal discussion of computer software and graphic calculators."* Joe Liddle WVC		
4:45 - 5:35	WAMATYC Meeting		

FRIDAY EVENING

6:00 - 7:00	LAKESIDE ROOM	NO HOST COCKTAILS
7:00 - 8:00	LAKESIDE ROOM	DINNER
8:00 - 9:00	LAKESIDE ROOM	*"Chaos in the Classroom"* Mike Sequeira COCC
9:00 - ???	ROOM 148	HOSPITALITY ROOM

SATURDAY MORNING

7:30 - 8:30	LAKESIDE ROOM	BREAKFAST

	BALLROOM A	BALLROOM B	BALLROOM C
9:00 - 9:50	*"Historical Relationships Between Newton's Method and Its Immediate Precursors and Successors"* T.J. Ypma WWU	*"Proof Without Words"* Gail Nord GU	*"Chaos in the Classroom - Techniques of Implementation"* Mike Sequeira COCC
10:05 - 10:30	*"The Precalculus Revitalization Project"* Carl Swenson SU	*"Another Look at Binomial Coefficients"* John Reay WWU	*"The Persistent 1/3"* James Duemmel WWU
10:45 - 11:35	*"Mathematics is the LANGUAGE With Which God Has Written the Universe"* Galileo Dave Hemme SSCC, SCC, HCC	*"Helping Teachers Understand the Adult Learner"* Helen P. Mrosla SU	*"Algebraic Geometry in Chemistry"* Yves Nievergelt EWU

12:00 - 1:00	LAKESIDE ROOM	LUNCH

ABSTRACTS

CHALICE, DON/HUNDLEY, DOUG
Western Washington University
"Julia Sets and Programs to Generate Them"
3:40-4:30 Friday Ballroom B
Julia sets are defined and examples are given. Doug Hundley will present several programs in Basic to generate various Julia sets.

CLARK, KAREN/NASON, DIANE
Tacoma Community College
"From Math Anxious to Math Able - A Coordinated Studies Approach"
9:00-9:50 Friday Ballroom A
This session will provide a unique approach to teaching a success oriented class linking Introduction to Algebra with Overcoming Math Anxiety. A math instructor and a counselor from TCC will present a cooperative teaching method which empowers students to become assertive learners and to continue their education as capable math students.

CURJEL, CASPAR R./NIEVERGELT, YVES
University of Washington/Eastern Washington University
"The Geometry of Multivariable Calculus"
3:40-4:30 Friday Ballroom C
We shall briefly report on a workshop funded by the Washington Center [···] in September of 1991. Then workshop participants will describe how the workshop helped them in improving their students' multidimensional intuition.

DUEMMEL, JAMES
Western Washington University
"The Persistent 1/3"
10:05-10:30 Saturday Ballroom C
A discussion of a simple max problem - suggested by postal rules - that has a surprising answer.

FISCHER, FRED W
North Seattle Community College
"Priority - Based Algebra; the New Algebra"
1:30-3:25 Friday Ballroom C
In this workshop will be presented the first new set of rules for algebra in 100 years. These rules are closely related to the rules for arithmetic and are simple and few. With these rules comes a technique which allows us to solve most equations in one step.

GREENWOOD, MIKE
Clark College
"WAMATYC - What is Going on in the State"
1:30-2:20 Friday Ballroom A
This is not a business meeting. Come find out what is happening with WAMATYC in relation to Boeing, the Washington State Mathematics Council, Superintendent of Public Instruction and other projects now underway.

HAFER, ANNE
Tacoma Community College
"My Students are THINKING: the Use of Team Projects in Calculus"
1:30-2:20 Friday Ballroom B
Over the last few quarters I've experimented using Dr. David Pengelley's NSF funded calculus projects in lieu of an exam in my classes. I'm pleased with the results and would like to share what I've done with interested instructors.

HANCOCK, HELEN
Shoreline Community College
"Increasing Minority Participation in Math-Based Disciplines: It isn't about passing. It's about excelling."
11:10-12:00 Friday Ballroom A
A report on the work of Uri Treisman and the Emerging Scholars Programs which originated at UC-Berkeley..What is being done to effectively adapt ESP to fit different local populations? The ESP model focuses on academic excellence (rather than remediation).

HEMME, DAVE
South Seattle, Shoreline, Highline
"Mathematics is the LANGUAGE With Which God Has Written the Universe" Galileo
10:45-11:35 Saturday Ballroom A
Math suggestions for Remedial - Vocational - Developmental - ESL classes emphasizing math as languages includes puns, mnemonics, etc.

HINTHORNE, STEVE
Central Washington University
"Fun With Metrics (Or How Far Is It, Anyway?)"
11:10-12:00 Friday Ballroom B
A short presentation of four metrics and their unit "circles." Includes audience participation.

HIRSCHFELDER, ROSEMARY/PRICE, BARBARA
University of Puget Sound
"Using Spreadsheets in Business Calculus"
10:05-10:30 Friday Ballroom B
Group and individual projects.

HOFFMAN, DALE.
Bellevue Community College
"Testing Concepts in Calculus"
10:05-10:55 Friday Ballroom C
A student's ability to manipulate formulas (taking limits, derivatives, and integrals) has little connection with understanding the concepts of calculus or using those concepts. This presentation includes examples of questions to get at a student's understanding of some of the concepts of calculus. Typically, these questions require a student to work with functions defined graphically, numerically, or as processes.

JORDAN, JAMES H
Washington State University
"Implicit and Explicit Teaching Changes Forced By Technology"
9:00-9:50 Friday Ballroom B
Maple, mathematica, derive and other technologies now available imply reorganization of the curriculum. Suggestions of what should go, what should stay, and what should enter.

LIDDLE, JOE
Wenatchee Valley College
"Informal Discussion of Computer Software and Graphic Calculators"
4:05-4:30 Friday Ballroom A
Informal discussion on the types of computer software and graphic calculators used in classrooms around the State of Washington. Bring your ideas to share.

LONG, CALVIN
Washington State University
"Some Machinations of Leonhard Euler"
11:10-12:00 Friday Ballroom C
A discussion of two examples of inspired guesswork (heuristic thinking) on the part of the great Euler.

Why is $\frac{\pi^2}{6} = \frac{1}{1} + \frac{1}{4} + \frac{1}{9} + \cdots$ anyway?

MAYO, BEN
Yakima Valley Community College
"Spaghetti Dinners and How They Relate to Combining Fractions"
9:25-9:50 Friday Ballroom C
A comparison is made between planning a dinner party and determining how to find the least common denominator through the use of prime factorization in order to add or subtract fractions.

MILLARD, CHUCK
Yakima Valley Community College
"Of Cashews, Macademias, C.D.'s, and Similar Mundane Things"
9:00-9:25 Friday Ballroom C
This short talk proposes to show structural similarities that I point out to students who struggle with "story problems" of the mixture - investment - coin types.

MROSLA, HELEN P.
Seattle University
"Helping Teachers Understand the Adult Learner"
10:45-11:35 Saturday Ballroom B
This session will focus on fifteen points which must be taken into consideration when teaching the adult learner. Practical suggestions and helpful hints will enable teachers to make use of the information as soon as they return to their classrooms.

NIEVERGELT, YVES
Eastern Washington University
"Algebraic Geometry in Chemistry"
10:45-11:35 Saturday Ballroom C
Completing the squares and factoring polynomials in several variables, identifying quadric surfaces, locating minima with calculus in two variables, and solving cubic equations solves a problem in chemical research and pharmaceutical analysis.

NORD, GAIL
Gonzaga University
"Patterns in Pascal's Triangle"
10:05-10:55 Friday Ballroom A
I will illustrate patterns and applications of Pascal's triangle. At the end I will open up for discussion so that the audience may share their pattern or application. (Handouts will be provided.)

NORD, GAIL
Gonzaga University
"Proof Without Words"
9:00-9:50 Saturday Ballroom B
I have collected the proofs without words from The College Journal and The Mathematical Gazzette. I will provide handouts containing the collection. These proofs can be used in the classroom to convince students of mathematical results.

REAY, JOHN Western Washington University
"Another Look at Binomial Coefficients"
10:05-10:30 Saturday Ballroom B
There is no end to nice, elegant, surprising results about binomial coefficients. Here's an example: Of the 1,000,001 numbers in the million-th row of Pascal's Triangle; 128 of them are odd and 999,873 of them are even.

RIZZUTI, JAN
Central Washington University
"A Multi-Representational Approach to Teaching Functions"
3:40-4:05 Friday Ballroom A
An approach to teaching functions, which stresses tables, graphs, and equations developed from functional situations, will be discussed. Research and teaching results will be reported. Discussion will focus on college level precalculus and calculus I.

SEQUEIRA, MIKE
Central Oregon Community College
"Chaos in the Classroom - Techniques of Implementation"
9:00-9:50 Saturday Ballroom C
As a follow-up to the talk on April 10, we will examine a number of ways to introduce and explore topics of fractals, chaos, and dynamic systems in the classroom. We will consider topics that can be presented in lecture format, as demonstrations, or in a coopertive-learning setting. Methods discussed will range from the use of manipulatives to the use of the TI-81 calculator and computer programs. Program listings and public domain software (Macintosh only) will be available - bring 3.5" disk(s).

SWENSON, CARL
Seattle University
"The Precalculus Revitalization Project"
10:05-10:30 Saturday Ballroom A
An overview of the NSF funded Precalculus Revitalization Project. How should precalculus mathematics be changed? Come and tell us.

WOOD, BETH
Whatcom Community College
"The Many Faces of Polyhedra"
2:35-3:25 Friday Ballroom B
Polyhedra are used to model concepts from group theory and graph theory as well as having some interesting intrinsic properties. The first 50 participants will construct and keep at least one polyhedra.

YANDL, ANDRE
Seattle University
"Remarks on the Teaching of Mathematics"
2:35-3:25 Friday Ballroom A
Illustrations from algebra, trigonometry, calculus, and linear algebra will be used to show how we can stress retention, visualization, understanding, and discovery in our teaching.

YPMA, T. J.
Western Washington University
"Historical Relationships Between Newton's Method and Its Immediate Precursors and Successors"
9:00-9:50 Saturday Ballroom A
We exhibit and analyze extracts from Newton's notes to trace the development of his method.

3 #s using 1, 2, 3, 4, 5; product of 2 #s = 3rd.

(12)(3) ≠ 45

e.g. none end in 5 (would need 5 or 0 on other side) #send

(1) ~~—~~

(2) ⇒ must have 51, 52, 53, 54 or 512, 521, etc?!

52 = (13)(4)

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Gerald Perryman

History of the Washington Community College Mathematics Retreat

1991	Pierce College and Tacoma Community College	Lake Chelan
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 Heft, Larry Larson, Jim Reif, and John Van Druff. 33 participants met at "The Lodge" at Ashford with sleeping bags. The cost was $16.68 per person.

Future Retreat Hosts

1993	*Highline Community College*
1994	*South Seattle Community College*
1995	*Skagit Valley Community College and Whatcom Community College*

PUZZLES AND PROBLEMS

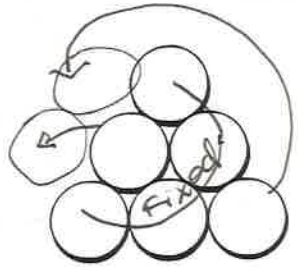
An unlimited supply of gasoline is available at one edge of a desert 800 miles wide, but there is no source on the desert itself. A truck can carry enough gasoline to go 500 miles (this will be called one "load"), and it can build up its own refueling stations at any spot along the way. These caches may be any size, and it is assumed that there is no evaporation loss. What is the minimum amount (in loads) of gasoline the truck will require in order to cross the desert? Is there a limit to the width of a desert the truck can cross? 2 loads (1500 mi?)

The digits 1 through 5 are used once each in forming three numbers. The product of two of the numbers is equal to the third number. What are the numbers? $52 = 13(4)$

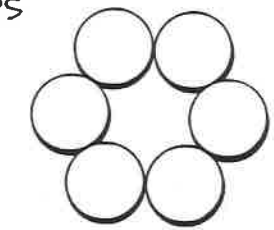
There is a simple procedure by which two people can divide a cake so that each is satisfied that he has at least half: One cuts and the other chooses. Devise a general procedure so that n people can cut a cake into n portions in such a way that everyone is satisfied that they have at least 1/n of the cake.

Five people and a horse were stranded in an orchard. They spent the first day picking apples for food. They piled them all up together and then went to sleep for the night. When they were all asleep one person woke up. He thought there might be a row about dividing the apples in the morning, so he decided to take his share. He divided the apples into five piles. He had one apple left over, so he gave it to the horse. By and by the next person woke up and did the same thing. He also had one apple left over which he gave to the horse. Each of the rest of the people did the same thing, one after another; each one taking a fifth of the apples in the pile when he woke up and each one having one left over for the horse. In the morning, when they divided the apples that were left, they came out with five equal shares. How many apples were there in the beginning? 3906 apples

Six pennies are arranged on a flat surface as shown to the left below. Move them into the formation shown below at the right in the smallest number of moves. Each move consists of sliding a penny, without disturbing any of the other pennies, to a new position in which it touches two others. The coins must remain flat on the surface at all times.



2 moves



Math 101 YVC

① Millard

"never seen in any text"

"cheap" value + "expensive" value = "mixture" value

"This is the pattern that has helped"

② Mayo only shows up!

Liz (1 tsp Basil)	Harry (no basil)	Jim (½ tsp.)	Basil	½ tsp
0	1	⅓	G. peppers	1c.
2	1	1	mushrooms	2c.

What should I buy at grocery store?

Let n = # apples in each share at end

$5\{5[5(5(5n+1)+1)+1]+1\}+1$

5th guy, 4th, 3rd, 2nd, 1st guy

$(25n+6)$

$[125n+31]$

$\{625n+156\}$

total = $3125n+781$

let n=1, 3906 apples?!

SILLY!!

let N = # apples bag

$\frac{N-1}{5}$ = ~~integer~~	1st guy
$\frac{\frac{N-1}{5}-1}{5}$	2nd
$= \frac{N-6}{25}$	
$\frac{\frac{N-6}{25}-1}{5} = \frac{N-31}{125}$	3rd
$\frac{\frac{N-31}{125}-1}{5} = \frac{N-156}{625}$	4th
$\frac{\frac{N-156}{625}-1}{5} = \frac{N-781}{3125}$ is an integer	5th

Suppose 1: ... N = 3906!!

P(a,b) Q(c,d)

Metrics

$d_E(P,Q) = \sqrt{(a-c)^2+(b-d)^2}$

$d_T = |a-c|+|b-d|$

$d_S = \max(|a-c|,|b-d|)$

$d_D = \begin{cases} 0 \\ 1 \end{cases}$

I need the largest amt of that ingr. I see in a single recipe"

5/6 "recipe" + 3/(1+2) "recipe"

2:3 "recipe"

2, 3, 7 are "ingredients"

d_D 0?

d_T

d_S

d_D all reals except (0,0)

U?

F

(0,1) (3,5) y=-1 (4,5) d=6 (4,3) d=4 (0,1) y=-1 (2,1)

circle → octahedron

circle → cube

GOAB?!

e.g ①

* loading station at edge of desert

Notes

Get 500 mi load, ie "1 load"

1- go 100 miles, leave 300 (enough to go), go back 100

1- go 150, leave 200 mi (enough gas to go), back 150

⋮

go x_i, leave $500-2x_i$ (enough gas to go), back x_i

⋮

We need $\sum_{i=1}^{k} 500-2x_i$ = 800 miles (enough to go)

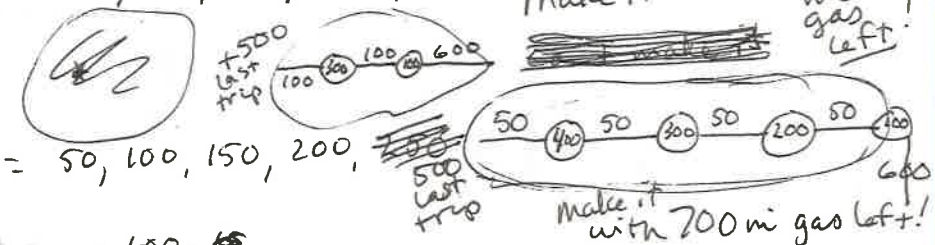
(k = # loads needed)

NOTE: if x_i is large, small supply is distributed

if $500-2x_i$ is large, k will be large!

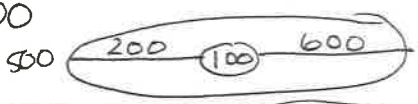
What if...

x_i = ~~50~~, 100, ~~150~~, 200,

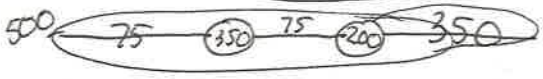


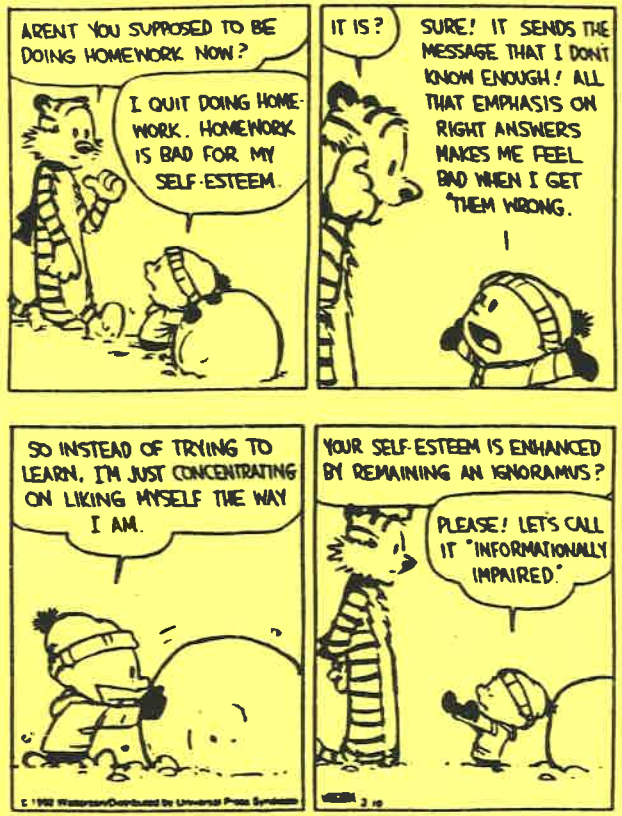
x_i = 50, 100, 150, 200, ~~250~~

x_i = ~~100~~, ~~125~~, ~~150~~, 200



x_i = 75, 150





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