Collected papers of

Lord Soumadeep Ghosh

Volume 30

Designing artificial reservoirs with convex hulls of substituted systems

Soumadeep Ghosh

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Abstract

In this paper, I describe how to design artificial reservoirs with convex hulls of substituted systems. The paper ends with "The End"

Introduction

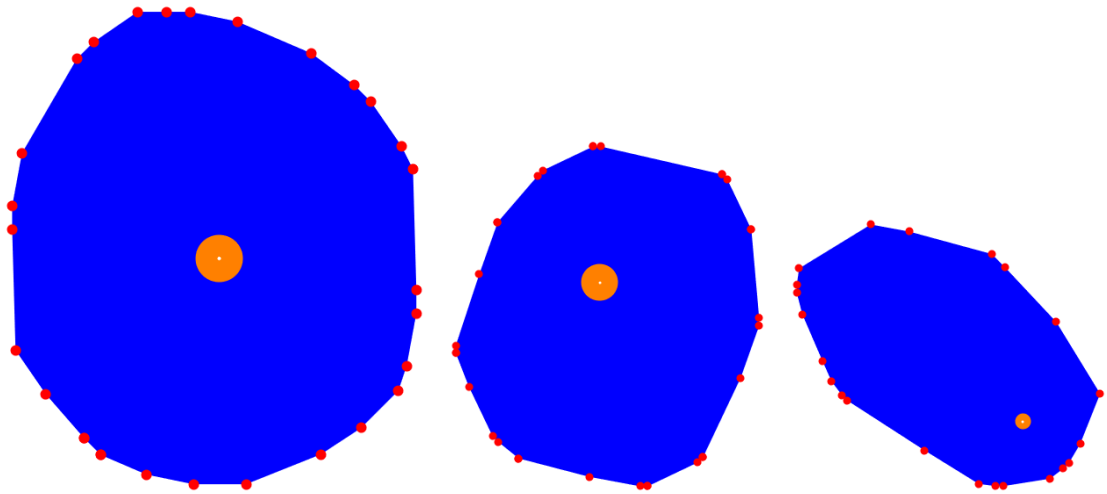
Designing artificial reservoirs with the traditional method of drawing is very old.

Using a computer algebra system (CAS) like Mathematica, designing artificial reservoirs with convex hulls of substituted systems is a fairly new method.

In this paper, I describe how to design artificial reservoirs with convex hulls of substituted systems.

Designing artificial reservoirs with convex hulls of substituted systems

The following three artificial reservoirs were designed with convex hulls of substituted systems:



In each image, the unit circle centered at $(0, 0)$ is shown in orange for reference.

Mathematica code to produce the first artificial reservoir above

```
Needs["ComputationalGeometry`"];
nIter = 8;
str = First[SubstitutionSystem[{"A" → "A+BABA", "B" → "B+BABA"}, "A+", {nIter}]];
asc = Association["A" → {1, 0}, "B" → {0, Pi / 4}, "+" → {0, -Pi / 4}];
pts = AnglePath[Lookup[asc, Characters[str]]];
pts = Union[pts];
chr = ConvexHullRegion[pts];
points = MeshCoordinates[chr];
order = MeshCells[chr, 2][[1, 1]];
polyCoords = Union[points[[order]]];
Length[polyCoords]
polygon = Polygon[polyCoords];
Area[polygon]
g = Graphics[{{Blue, chr}, {Red, PointSize[1/40], Point[polyCoords]}, {Orange, Disk[]}, {White, Point[{0, 0}]}}]
```

The End

The plutARCH model of an individual's wealth

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the plutARCH model of an individual's wealth.
The paper ends with "The End"

Introduction

Following the reduction of population after oliGARCHy, the economy becomes a plutARCHy.

In this paper, I describe the plutARCH model of an individual's wealth.

The plutARCH model

The plutARCH model is given by the differential equation

$$a\frac{\partial W(t)}{\partial t} + bW(t) + ct + d + e\frac{\exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right)}{\sqrt{2\pi}\sigma} + f \ \{ \begin{cases} \frac{\exp\left(-\frac{(\log(x)-\nu)^2}{2\tau^2}\right)}{\sqrt{2\pi}x\tau} & x > 0 \\ 0 & x \leq 0 \end{cases} = 0$$

where
$W(t)$ is wealth of the individual as a function of time
a, b, c, d, e, f are specific reals
t is time
x is any variable independent of time
$\exp(x)$ is the exponential function
$\log(x)$ is the logarithm function

A solution to the plutARCH model

A solution to the plutARCH model is given by

$$W(t) = \frac{2\sqrt{\pi}ac\sigma\tau x + b\left(-2\sqrt{\pi}\sigma\tau x(ct+d) - \sqrt{2}e\tau x\exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right) - \sqrt{2}f\sigma\exp\left(-\frac{(\nu-\log(x))^2}{2\tau^2}\right) + \sqrt{2}f\sigma\theta(-x)\exp\left(-\frac{(\nu-\log(x))^2}{2\tau^2}\right)\right)}{2\sqrt{\pi}b^2\sigma\tau x} + g\exp\left(-\frac{bt}{a}\right)$$

where
g is an arbitrary constant of integration
$\theta(x) = \begin{cases} 1 & x \geq 0 \\ 0 & x < 0 \end{cases}$ is the unit step function

The End

Solutions to a useful family of equations

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe solutions to a useful family of equations for various n.
The paper ends with "The End"

Introduction

The family of equations

$$\frac{\sum_{i=1}^{n} \lambda_i}{n} \frac{\sum_{i=1}^{n} \mu_i}{n} = \sum_{i=1}^{n} \lambda_i \mu_i$$

for various n is useful to many fields.
In this paper, I describe solutions to this useful family of equations.

For n = 2

There are at least 5 known solutions:

1. $$\mu_1 = 18, \mu_2 = 2, \lambda_1 = 45, \lambda_2 = 195$$
2. $$\mu_1 = 320, \mu_2 = 90, \lambda_1 = 30, \lambda_2 = 522$$
3. $$\mu_1 = 572, \mu_2 = 52, \lambda_1 = 1, \lambda_2 = 4$$
4. $$\mu_1 = 572, \mu_2 = 52, \lambda_1 = 62, \lambda_2 = 248$$
5. $$\mu_1 = 665, \mu_2 = 35, \lambda_1 = 66, \lambda_2 = 231$$

For n = 3

There are at least 3 known solutions:

1. $$\mu_1 = 228, \mu_2 = 30, \mu_3 = 12, \lambda_1 = 25, \lambda_2 = 1, \lambda_3 = 275$$
2. $$\mu_1 = 64, \mu_2 = 62, \mu_3 = 14, \lambda_1 = 1, \lambda_2 = 1, \lambda_3 = 61$$
3. $$\mu_1 = 147, \mu_2 = 21, \mu_3 = 3, \lambda_1 = 75, \lambda_2 = 64, \lambda_3 = 608$$

For n = 4

There is at least 1 known solution:

1. $$\mu_1 = 3360, \mu_2 = 210, \mu_3 = 255, \mu_4 = 255, \lambda_1 = 1, \lambda_2 = 69, \lambda_3 = 1, \lambda_4 = 1$$

The End

The binomial theorem

Soumadeep Ghosh

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Abstract

In this paper, I describe the binomial theorem.
The paper ends with "The End"

The binomial theorem

The binomial theorem states that for a positive integer $n > 0$

$$(x+y)^n = \sum_{r=0}^{n} {}^nC_r x^{(n-r)} y^r$$

where

$${}^nC_r = \frac{n!}{(n-r)!r!}$$

where
$0! = 1$ and for $n > 0,\ n! = n(n-1)!$

The End

Theoretical gravity for ballistics

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe theoretical gravity for ballistics.
The paper ends with "The End"

Introduction

Theoretical gravity for ballistics is different from theoretical gravity for objects of negligible size and small range because theoretical gravity for ballistics varies with both latitude and height.
In this paper, I describe theoretical gravity for ballistics.

Theoretical gravity for ballistics

Theoretical gravity for ballistics is

$$g(\phi, h) = \frac{(2a+b)^2 \left(ae - (ae - bp)\sin^2\phi\right)}{a(2a+b+3h)^2\sqrt{1 + \left(\frac{b^2}{a^2} - 1\right)\sin^2\phi}}$$

where
a is the equatorial semi-axis
b is the polar semi-axis
e is the acceleration due to gravity at the equator
p is the acceleration due to gravity at the poles
$-\frac{\pi}{2} \leq \phi \leq \frac{\pi}{2}$ is the latitude
$0 \leq h << \frac{2a+b}{3}$ is the height

The End

War Intelligence Report #835

Cities at nuclear risk during WWIII

Mixed-methods research has concluded that WWIII will involve the destruction of several cities that are of strategic importance. This declassified report provides the best known estimates of six cities that may be destroyed during WWIII with high probability.

WWIII will start when Russia attacks the UK, Germany and/or the USA. For this war to begin, Russia will find a breakthrough in at least one of these three cities:

1. London 2. Frankfurt 3. New York City

Conversely, three strategic cities in Russia are also at nuclear risk from the UK, Germany and the USA. For this war to NOT begin, the UK, Germany and the USA will find a breakthrough in at least one of these three cities:

1. Moscow 2. Petersburg 3. Vladivostok

Due to prior advancements in ballistics capabilities in all nations involved, ICBM attacks will be difficult to predict. This uncertainty will be a key feature that will cause WWIII. The best known estimates of the flight paths of ICBMs that will initiate WWIII are shown on the next page.

ICBM flight paths with high probability of occurrence are in RED.

ICBM flight paths with medium probability of occurrence are in BLUE.

ICBM flight paths with low probability of occurrence are in GREEN.

Additionally, the use of tactical nuclear weapons will be common during WWIII. These weapons with low yields but high portability will be useful to eliminate key persons during the war and thus, will be used by all sides involved.

Finally, the role of the very top leadership in each of these nations will not be discounted. Both sides will try to malign the other side and total war remains a distinct possibility, albeit with low probability.

Race

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe race.
The paper ends with "The End"

Introduction

There are various theories of race. But in this paper, I describe the reality of race as percieved by me, the representative agent of economics.

Preliminaries

In a previous paper, I've described the reality of the four genders as percieved by me, the representative agent of economics.

In a previous paper, I've described the three sexualities in existence.

In a previous paper, I've described the origin of color.

Race

Race is the Cartesian product of color, gender and sexuality.

Thus, there are $3 \times 4 \times 3 = 36$ races in existence.

The End

For the Indo-confutious people

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the Indo-confutious people, the associated problems and the possible remedies to these problems.
The paper ends with "The End"

Introduction

Contrary to the beliefs of most of the population of both India and China, there do exist Indo-confutious individuals in both India and China.

In this paper, I describe the Indo-confutious people, the associated problems and the possible remedies to these problems.

The Indo-confutious

Since a communist sub-economy existed and still exists in India that influences and is influenced by the Chinese Communist Party, there exist the Indo-confutious people in **both** India and China.

Some of them were refugees or infiltrators from confutious economies outside India who found security in India, some became naturalized citizens of India after considering the benefits of doing so and some of them are citizens of India by birthright through marriage.

The rights of the Indo-confutious

As of this writing, the Indo-confutious people of India enjoy far better human rights and benefits than do the Indo-confutious people in China and even the confutious people in China.

In fact, it's one of the reasons that there's still infiltration across the Indo-China border with many Chinese refugees and infiltrators fleeing to either North India or North-East India or Nepal or Bhutan.

This existing **arbitrage of human rights** also produces the problem of the **arbitrage of Chinese humanity** with many poor Chinese young men and women being forced into committing crimes one way or another, including smuggling, human trade and war crimes.

The Indo-confutious trust problem

As of this writing, irrespective of their origin, the ground fact is that the Indo-confutious individuals of India are not completely trusted by many individuals in India, even when they're innocent. I suspect this Indo-confutious trust problem is much worse in China.

While much has already been done to alleviate the Indo-confutious trust problem in both India and China, the ground fact is that without the complete co-operation of China, this problem is difficult to solve.

While the top brass in China sees their immense population as a hedge against war, India realizes that all isn't well in China, because if it were, there wouldn't be infiltration across the Indo-China border in the first place.

Remedies

If the **"Sabka Saath Sabka Vikaas"** motto of the current Government of India is to be realized, then guaranteeing the rights of the Indo-confutious people in **both** India and China is the best remedy to solve this problem in the long-term. However, this remains a contested political issue in **both** India and China, **but** much more so in China.

In such a situation, India and all of Asia must encourage China to not see their population as a hedge against war but rather as productive members of a society that had philosophical beginnings in antiquity, just like India.

The political dividends to doing so are immense, since India and China together have a population totaling around 3 billion individuals and joining hands will be beneficial to not just India and China, but to all of Asia, including in the low probability event of an attack on Asia by the West.

Conclusion

It's readily apparent that there exists a major problem to be solved between India and China. But it should also be apparent from the writing above that the best way to solve this problem is for China to change its posture on the treatment of the Indo-confutious people in China through diplomatic means so as to **disengage** rather than engage India in a possible pan-Asian war in the future.

The End

The age of fakery

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the age of fakery, the associated problems and the remedy to these problems. The paper ends with "The End"

Introduction

As of this writing, we live in an age of fakery. There are fake "institutions" in most economies. In this paper, I describe the age of fakery, the associated problems and the remedy to these problems.

Implications of economic theory

In a previous paper, I've described the theory of economic gearing that states there can be no more than 14 sub-economies in an economy.

The theory of economic gearing applies to any and every economy, including the global economy, which means there can be no more than 14 sub-economies in the global economy.

Even if each of these sub-economies had a central bank, there can be no more than 14 central banks in existence.

A similar argument can be made for universities: Since each of these 14 sub-economies is aligned either left, center or right, there can only be a maximum of 2 universities (with the remaining 2 alignments) in each of the sub-economies, which means that there can be no more than 28 universities in existence.

The age of fakery

Here is a list of so-called "central banks" as of this writing:

`https://www.swfinstitute.org/fund-rankings/central-bank`

Here is a list of so-called "universities" as of this writing:

`https://www.topuniversities.com/student-info/choosing-university/worlds-top-100-universities`

How can this be?! It can be only if we live in an **age of fakery**.

The remedy to these problems

Every fake "institution" is a burden on the finances of the host nation-state.

If this age of fakery is to end, fake "institutions" must be destroyed at all costs.

The End

The easy way to learn mathematics

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the easy way to learn mathematics. The paper ends with "The End"

Introduction

Many individuals want to know mathematics. In this paper, I describe the easy way to learn mathematics.

The easy way to learn mathematics

Ae shob bolle kichhu hawbey na
Duniyaata onkay chawlay

The End

The easy way to learn chemistry

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the easy way to chemistry. The paper ends with "The End"

Introduction

Many individuals want to know chemistry. In this paper, I describe the easy way to learn chemistry.

The easy way to learn chemistry

Podartho podarthay hawye podartho.
Podarthay biyog podartho o podartho,
jotokhonna paaya jaye onu.
Onu thike bayroye pormaanu.

The End

A useful result involving the Hessian matrix of the general conic

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe a useful result involving the Hessian matrix of the general conic.
The paper ends with "The End"

Introduction

The general conic is

$$f(x,y) = ax^2 + 2hxy + by^2 + 2fx + 2gy + c = 0$$

In this paper, I describe a useful result involving the Hessian matrix of the general conic.

The Hessian matrix of the general conic

The Hessian matrix $\mathbf{H_f}$ of $f(x,y)$ is

$$\mathbf{H_f} = \begin{pmatrix} 2a & 2h \\ 2h & 2b \end{pmatrix}$$

The inverse of $\mathbf{H_f}$ is

$$\mathbf{H_f^{-1}} = \begin{pmatrix} \frac{2b}{4ab-4h^2} & -\frac{2h}{4ab-4h^2} \\ -\frac{2h}{4ab-4h^2} & \frac{2a}{4ab-4h^2} \end{pmatrix}$$

A useful result involving the Hessian matrix of the general conic

$$\mathbf{H_f} = \mathbf{H_f^{-1}}$$

$$\iff$$

$$\left(b = -a \wedge \left(h = -\frac{1}{2}\sqrt{1-4a^2} \vee h = \frac{1}{2}\sqrt{1-4a^2}\right)\right) \vee \left(\left(a = -\frac{1}{2} \vee a = \frac{1}{2}\right) \wedge \left(b = -\frac{1}{2} \vee b = \frac{1}{2}\right) \wedge h = 0\right)$$

The End