ZULF'S STANFORD ANALYSIS FALL 2011 QUAL

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1. Problem I.1

(a) We are given a *finite* measure space $(X, \mathcal{A}, m)$ and an $\mathcal{A}$-measurable $f : X \to \mathbf{R}$ and asked to prove

$$\lim_{n\to\infty} \|f\|_p = \|f\|_\infty$$

For me it is clearest to consider the case $m(X) = 1$. First note that for all $1 < p < \infty$ in this case,

$$\|f\|_p = (\int |f|^p m(dx))^{1/p} \leq (\|f\|_\infty^p m(X))^{1/p} = \|f\|_\infty$$

Then repeated applications of Cauchy-Schwarz gives

$$\int |f| dx \leq (\int |f|^{2^n} dx)^{1/p}$$

where the second integrand is $g(x) = 1$ and we use $m(X) = 1$. This gives us a monotonically increasing sequence

$$\|f\|_1 \leq \|f\|_2 \leq \cdots \|f\|_{2^n} \leq \|f\|_\infty$$

This is quite nice as it shows that

$$\lim_{n\to\infty} \|f\|_{2^n} \leq \|f\|_\infty$$

The limit exists, is lower than $\|f\|_\infty$. We need now to show that the limit is actually achieved.

By the way, the statement of the theorem does not hold when $m(X) < 1$, as scaling for $1 \leq p < \infty$ includes $m(A)$ term while $\|f\|_\infty$ does not include any $m(A)$. This is fine, apologies, as $m(A)^{1/p} \to 1$ as $p \to \infty$.

Let $0 < \delta < \|f\|_\infty$ since the $f = 0$ case is easy. Let

$$S_\delta = \{x : |f(x)| \geq \|f\|_\infty - \delta\}$$

Then

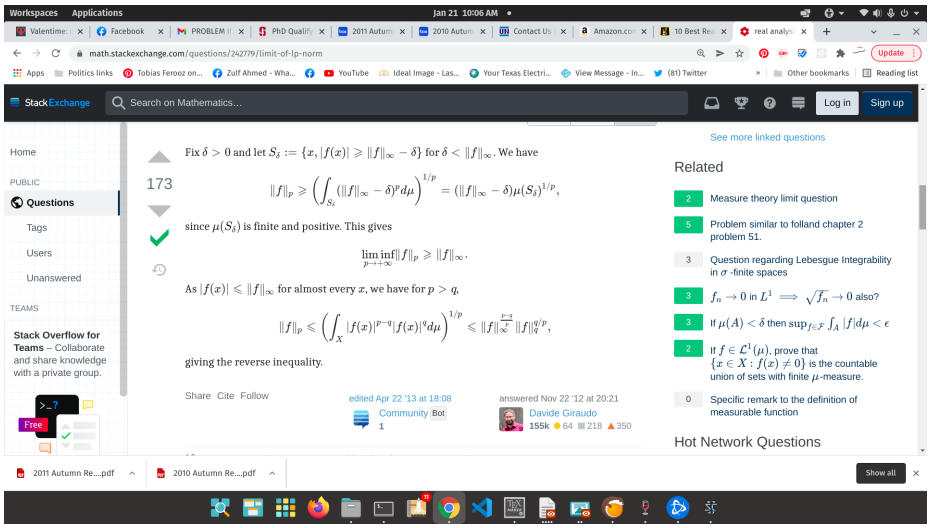
$$\|f\|_p \geq (\int_{S_\delta} (\|f\|_\infty - \delta)^p m(dx))^{1/p} = (\|f\|_\infty m(S_\delta)^{1/p}$$

This gives us

$$\liminf_{n\to\infty} \|f\|_p \geq \|f\|_\infty$$

I did not invent this part myself. This comes from here.

Date: January 27, 2022.



2. What I Am Trying To Accomplish With My Life

I am doing these Stanford Mathematics Ph.D. Quals for practice gaining solid footing in analysis, but what I am trying to do with my life are some other projects, all being strongly obstructed by Bill Gates. I have earned $620 million from Finance that I cannot collect because Bill Gates used illegitimate powers against me. But two other project ideas are more important. One is the idea of Quant Positive Psychology, based on the fantastic success of Quant Finance. I want to set up a couple of companies in San Francisco with a Positive Psychology Quant where Positive Psychologists can work on large scale implementation of Quant Positive Psychology program and build up a new area that does not exist yet. Another is Global Individual Debt. I have had many years of experience in corporate America and believe that I will be able to produce lasting institutions. But I need full backing of Stanford. I am seeking full professorship for work that I have already done in Science – not just my Four-Sphere Theory but also work on Universal Human Moral Nature.

3. Problem I.1(b)

I will begin with my approach to solving the problem. We will be using the Poisson integral formula to determine the holomorphic function f within Ω_δ from its boundary values $\varphi(e^{i\theta})$.

We introduce
$$P_r(\theta) = \frac{1 - r^2}{1 - 2r\cos(\theta) + r^2}$$
And we let
$$K(r,t) = \int_{-\pi}^{\pi} P_r(\theta - t) e^{im\theta} d\theta \tag{1}$$
where we consider $m \geq 1$ and we have switched to $m = -n$.

The Poisson integral formula led us to Fourier coefficients
$$(Ff)(re^{i\theta}) = \frac{1}{(2\pi)^{3/2}} \int_{-\pi}^{\pi} K(t)\varphi(e^{it}) dt$$

We will have faith that (1) contains the secrets of our hearts regarding various sorts of bounds on the Fourier coefficients. Then we will let take the limit $r \to 1$ without the usual sort of timidity that this would lead to disaster and lead Reason to greater heights of folly noting that $f \in C(\bar{\Omega}_\delta)$.

At this point I do not know where the enterprising journey to the underworld will lead, what horrors and monsters we shall have to slay with the blessed weapons of Siméon Denis Poisson who died in 1840, and was actually alive when President Andrew Jackson had ordered effective genocide against Native Americans in the Indian Removal Act of 1830, and yet he still upheld more Civilised vision than the barbarism to which America would have sunk itself.

3.1. **Zulf's Attempts To Avoid Jambalaya.** We are extremely jambalaya-conscious, and want to avoid it by any manner possible. For this reason, we will just examine a formal analogy for $K(t)$ to get some sense of where our estimate will come from.

We let

$$K_0(t) = \int_{-\pi}^{\pi} \frac{\cos(m\theta)d\theta}{a - b\cos(\theta) - c\sin(\theta)} \tag{2}$$

This a jambalaya-free analogue of the real part of $K(t)$ from the last section with constants a, b, c to avoid unhealthy intrusion of jambalaya.

If we are able to get any estimates involving m at all, it will be localised in this and the analogous imaginary part of $K(t)$.

We have used the addition formula for cosine, i.e.

$$\cos(\alpha - \beta) = \cos(\alpha)\cos(\beta) + \sin(\alpha)\sin(\beta)$$

and removed the various nuisance parameters to constants in order to focus on the potential source of an estimate of the type

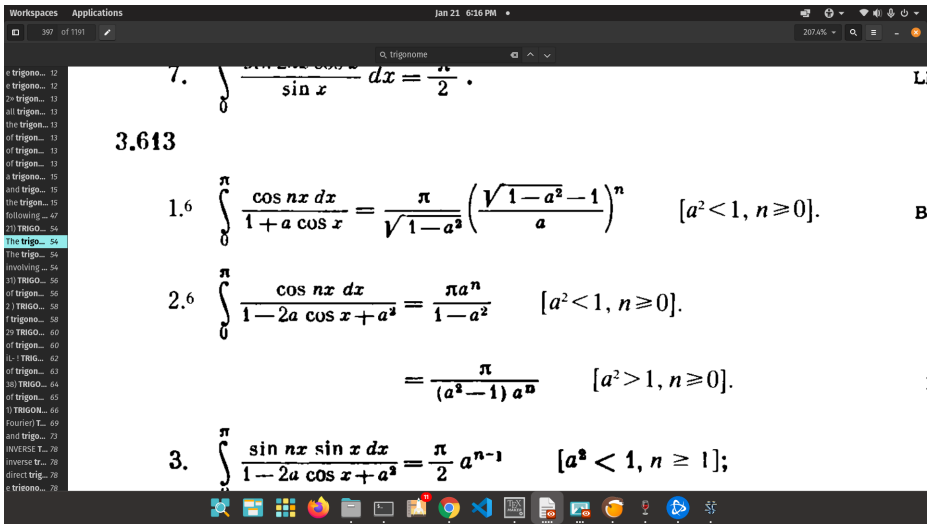
$$|K_0(t)| \leq Cm^{-k}$$

for various $k > 0$. It's a trigonometric integral, and anyone with any experience with Whittaker and Watson's 1915 *A Course In Modern Analysis* ought to treat these things with extreme respect. They do indeed bite, and some of them think they are pit-bulls.

4. Zulf Eyes Gradshteyn and Ryzhik 3.613

Years ago, Zulf won some sort of prize in high school, something called the "Minerva Award" I think and the award included a table of formulae and integrals. Those were carefree youthful years, and now I am approaching 50, closer to the end rather than the beginning for the fateful *Life and Times of Zulfikar Moinuddin Ahmed*. What I learned, after examining the formulae, is that I did not want to integrate by parts and use all sorts of other tricks to get exact formulae for the rest of my life. I am profoundly grateful, therefore, for Gradsheyn and Ryzhik. I do examine the formulae every time I have something that has the looky-feely of some exact formula for which not I but *someone else* does the various treacherous contour integrals and such.

With this spirit of not wanting to do any hard work at all, let us then examine 3.613 of Gradshteyn-Ryzhik.



$$7.\quad \int_0^{\pi} \frac{\dots}{\sin x}\,dx = \frac{\pi}{2}\,.$$

3.613

$$1.^6\quad \int_0^{\pi} \frac{\cos nx\,dx}{1+a\cos x} = \frac{\pi}{\sqrt{1-a^2}}\left(\frac{\sqrt{1-a^2}-1}{a}\right)^n \qquad [a^2<1,\ n\geqslant 0].$$

$$2.^6\quad \int_0^{\pi} \frac{\cos nx\,dx}{1-2a\cos x+a^2} = \frac{\pi a^n}{1-a^2} \qquad [a^2<1,\ n\geqslant 0].$$

$$= \frac{\pi}{(a^2-1)\,a^n} \qquad [a^2>1,\ n\geqslant 0].$$

$$3.\quad \int_0^{\pi} \frac{\sin nx\sin x\,dx}{1-2a\cos x+a^2} = \frac{\pi}{2}\,a^{n-1} \qquad [a^2<1,\ n\geq 1];$$

Yes, it does not contain the $\sin(\theta)$ term, but it does contain other useful terms from (2).

Now mathematicians can balk at my effort to avoid any work all they like, but you see, I am an experienced scientist, and for me, this is *great progress* to find anything that could lead to a solution.

4.1. **Series Expansions.** Let us go back to elementary issues of series expansions. Consider this formal expansion.

$$\frac{A}{B-x} = \frac{A}{B}(1+z+z^2+z^3+\dots) \tag{3}$$

with $z = x/B$. This formal procedure, we know succeeds in producing rigorous mathematics when $|x/B| < 1$. We know this from elementary analysis.

We want to try this first with the following:

$$A = \cos(m\theta)$$
$$B = a - b\cos(\theta)$$
$$x = c\sin(\theta)$$

First we just *glibly assume* the following condition. At this point we do not care too much whether it is true or not.

$$\left|\frac{c\sin(\theta)}{a-b\cos(\theta)}\right| \leq 1-\delta \tag{4}$$

for some constant $\delta > 0$.

We repeat that we do not care at this point whether (4) is true or not in actuality, and we assume it is true. In this case, we have

$$|K_0(t)| \leq (1-\delta)^{-1}\int_{-\pi}^{\pi} \frac{\cos(m\theta)d\theta}{a-b\cos(\theta)}$$

and then we apply the Gradsheyn-Ryzhik 3.613 from the last subsection and calculate the exact integral that remains.

$$\frac{1}{a}\int_{-\pi}^{\pi}\frac{\cos(mx)}{1+(b/a)\cos(x)}dx=\frac{2\pi}{\sqrt{1-(b/a)^2}}\left(\frac{\sqrt{1-(b/a)^2}-1}{b/a}\right)^m \tag{5}$$

4.2. **Don't Touch Anything And Back Away Slowly.** Now we carefully back away slowly, since we have something that might work and we don't like even a pindrop collapsing our house of cards, the various plans of mice and men, and we dislike provoking the gods since we are rather mystical about these situations.

The questions on our mind are (a) What are a and b exactly? We ask that question first to be *optimistic*. All these rational decision-theorists do not understand a thing: optimism decides our *order of activities* you see. We do things to maximize optimism, and not all ordering are equivalent. We're not Vulcan, Jim, we're human beings.

$$\begin{aligned}a&=1+r^2\\b&=2r\cos(t)\\c&=2r\sin(t)\end{aligned}$$

we will have $a\sim 2$ and $b\sim 2\cos(t)$ and $c\sim 2\sin(t)$ as $r\to 1$. So that is very good because this leads us to

$$|\frac{c\sin(\theta)}{a-b\cos\theta}|\sim\frac{c(t)\sin(\theta)}{2-b(t)\cos(\theta)}$$

It might be better to get some reasonable estimate here. We could get an estimate of this for $r<1-\delta$ to get some sense as otherwise the max is 1, which is not as useful.

So the problem is delicate, which is not surprising. Great we can prove that if $r\leq 1-\delta$ then the quantity above is bounded by $1-\delta$. I won't go into this estimate right now. Let us work with this and examine the estimates with $\delta>0$ positive. This δ is not the same as the one defining Ω_δ so pretend we had called the original *delta* instead δ_0. That is not interesting to us.

4.3. **The Fruits Of Exact Formula.** The major term for $K_0(t)$ ought to be

$$K_0(t)\sim C\frac{2\pi}{\sin(t)}\left(\frac{\sin(t)-1}{\cos(t)}\right)^m$$

This is the major fruit from the exact formula. There ought to be a similar result for the imaginary part of $K(t)$. Now precise correct proof can proceed mostly by standard methods in analysis.

5. Zulf Invokes Clout With Stanford University

Dear Stanford University, I have achieved and delivered a highly nontrivial result in the paragraphs above. I expect that you will, following ancient norms of Civilisation, grant me a modicum of *clout*. I will immediately take this *clout* that you will offer me and seek immediately to use it to seek strongly aggressive policies against Bill Gates. He is an extreme danger to all white people and to Western Civilisation. I, Zulfikar Moinuddin Ahmed, in the lineage of aristocratic nobility of several millenia of Vedic Civilisation, and I, an Asian-American believer in natural rights of Man and of lofty republicanism, like my illustrious Princeton predecessor

James Madison, like my Romantic predecessor *Percy Bysshe Shelley*, seek full compliance to heed my warnings against the wretched knave Bill Gates and cast him out of all of Civilisation with extreme prejudice. I will not die knowing that I have not done my duty to American white people who had been kind to me, that I had not done my filial piety to my late father and honour to my ancestors, to feel that I did not do my best to uphold the virtues of Shelley's Prometheus, and so I will use this clout immediately to seek Stanford's assistance at hurling Bill Gates from all of Civilisation.

6. Initial Intuitive Foray Into Particles In Four-Sphere Theory

I will return to other problems of Fall 2011 Analysis Qual at a later time. I will take a long detour now. Only very slowly since my initial ideas of Four-Sphere Theory developed have I considered one of the most profound unanswered questions about this existence in which we live. I will step far away from the formal norms of mathematics for this.

You see, I was just looking over some chapters of Bers, Shechter and John's *Partial Differential Equations* just now. I often like to ponder about the sorts of questions that I asked as a child, still at 49, for which I do not have a satisfactory answer.

Four-Sphere Theory will definitely succeed in displacing Quantum Field Theory, General Relativity and Expansionary Cosmology because it is *numerically superior* to these theories. It will match measurements in Nature better than these extant theories of the 1900-1930 paradigm. But that is not enough for me; that is not enough for *us* for we are the human race, eternally in pursuit of deeper understanding of the existence in which we spend our all too finite time lives. Always, we are aware of our mortality, and this awareness combined with a deep sense we have of need for belonging in stability, to *be here now*, to exist because we are *needed here now*, and to understand what this *here* is fundamentally, these questions from the depths of each of our hearts and souls, these persist.

Well I am not talented in profound poetry like Rainer Maria Rilke was, who pushed within his own soul to seek answers and found some that have moved the whole world. I have a different set of gifts. I look, instead at simpler things more often.

The question on my mind today is this: all of existence is a four-sphere vibrating membrane, and the fundamental law governing all of macroscopic phenomena is the wave equation, with some minor issues of source terms and inhomogeneity added.

A natural question is, what is so spectacularly curious about these zonal spherical harmonics of the four-sphere? That seems to invite our attention. These are the essence of particle nature of existence, in our view. Why do these particles have any lifetime at all? What about them is a *singularity* that seems to invite a closer look at how the evolution of the matter and energy of the entire universe forms, for some small time, singularities that have some sort of rotational symmetry that is loved by the wave equation, so they act as propagation of singularities.

Let me return to the context, in order not to confuse my dear reader. Our four-sphere theory has only a single fundamental law, a wave equation on spinor fields. And then, in due time we ask about how objects follow classical Lagrangian or Hamiltonian mechanics, we have to seek derivations from the Ahmed-d'Alembert law, a.k.a. the S4 Electromagnetic Law in Four-Sphere Theory.

We expect that the mathematical work on propagation of singularities by classical wave equation, will yield classical dynamics for particle clusters. I will not rush to prove theorems here. These will occur in time naturally. Instead I will be curious about how singularities form and why the zonal harmonics are *naturally associated* with the sort of singularities that arise in spinor field wave equations. In other words, what keeps things together in existence, and especially why there is strong role of four-sphere homogeneous geometry in what occurs in Nature.

I want to assure my dear reader that this is no idle speculation, and that this question is profound, for the way in which existence and Nature works is tied up in natural relationship between the geometry and analysis here in a fine-tuned manner, and this is a great moment in history of human race when we, the fleeting, find something profound about what is fleeting and what is not in this existence, something with great certainty, perhaps for the first time in our short seven million year evolutionary history.

7. My Message To France

Great job totally destroying Bill Gates 'Dolls' Folder. Destroy all things and everything in his Empire. I'll take the blame. I'll send you a nice Bengali poem recitation as a present [2]. I'm open to diplomatic relationships with all nations independently of United States. You did a good job gifting America with the Statue of Liberty. I'll open diplomatic channels with you and with Germany too, and eventually all nations.

It's true, I had the whole Asterix and Obelix collection and even some hardcover collections. I loved them. I am into The Incal and other Moebius works too.

8. Hidden History Of Four-Sphere Theory

I can tell you my own thoughts about what led me to four-sphere theory, and I do this elsewhere. But I am fascinated by the deep history of *mathematics* that led to this profound success of mine. This is not at all easy for me, since I am not a trained mathematical historian. I am only beginning to understand some of the currents of Mathematics that led me to have extremely strong confidence that my instinctive reaction that *quantisation of energy and localised particles* are due to the spectral theory of the Laplacian on the sphere.

This is a delicate issue, because when Max Planck discovered quantum of action and quantisation of energy in 1900 he was just a few years before events that led Hilbert to institute a program after 1903 to systematically seek eigenfunctions of the Laplacian and solve various partial differential equations using them.

You see, I have my own history, where it was good experience of a course at Princeton taught by Peter Sarnak that had given me strong sense of the issues of spectral theory of *compact* riemannian manifolds. For whatever reasons – and I delve into some elsewhere, I examined physics history and decided that there was very strong cause to *doubt non-compactness of spatial geometry of the universe*. I felt that quantisation of energy is not sensible in a non-compact geometry for the entire universe. I thought four-sphere is the right model.

But deeper understanding of the history is slow still. You see, the compact manifold geometry as the *source for quantum phenomena* was immediately obvious to me in 2008, and I just knew that this was right. The reason for people refusing

to take this seriously was *sociology of paradigm science* and I understood that as well in 2008 in the Thomas Kuhn's *The Structure of Scientific Revolutions* sense. But there is deep serious content here in mathematical history too. I was strongly trained to consider the eigenfunctions of the Laplacian on a compact manifold as part of my geometric *intuition* by not just Peter Sarnak but by all my geometric training.

Let me put things in context as best as I can. You see, the *1900-1930 paradigm* is very bad once you realise that we will not get anywhere without four-sphere *compact homogeneous geometry of Nature*. You have to have perspective to see this clearly. Einstein and Quantum Physicists were simply not experienced enough in mathematics in 1900-1920 to have seen this clearly. They also relied on Maxwell's Equations being right exactly. In hindsight, I ought to have seen immediately in 2008 that a classical wave equation on spinor fields is the correct fundamental law. But it was not so easy because *Scientific Revolutions* are never easy. It took me literally a decade before I saw this clearly.

Before Hilbert's program of 1903-5 – I am being rough here – mathematicians did not have enough appreciation for the value of discrete spectrum for various self-adjoint compact operators (the resolvents, not the differential operators).

So let me take a step back again. It is Haim Brezis and Felix Browder's important historical paper on Partial Differential Equations in twentieth century that is helping me sort out these issues. We are still far from having just the right views about many of these issues. Quantisation as purely geometric 'pure tones' phenomena was not clear because mathematical experience was underdeveloped. It's foolish to see anything wrong with what Einstein and the Quantum Physicists did instead.

But my confidence that this Four-Sphere Theory Revolution is *guaranteed* is quite strong because once you know you can never go back.

9. My Suggestion: Billy Boy Old Chap

I use various addressing for Bill Gates. I recommend usage of *Billy Boy Old Chap*. It's not as uncouth as other things I call the man.

10. A Short Note To Lee Smolin

Dear Lee Smolin,

Please do take a look at the numerical success of my Four-Sphere Theory when assessing. My theory is not addressing contemporary concerns. It is a fundamental physics theory challenging QED, GR, Expansionary Cosmology. I have extremely strong confidence it will be superior in measurement matches without any doubts.

11. My Interest In Re-Engagement Of Mathematics And Science

I just obtained *A History Of Analysis* edited by Hans Niel Jahnke. I am getting increasingly serious about gaining a firmer and deeper understanding of Analysis. Nineteenth century is seen by some historians as a century that firmed mathematical rigour and simultaneously *emancipated* mathematics from Science. I will consider this to be an official scholarly historical view.

I will distinguish this from my own views which I will be exposing and attempting to clarify. My dear reader should, therefore, not consider my view to be impersonal.

I do not have the stature of Gauss or Laplace in authority and therefore I do not consider it irresponsible for presenting my personal views freely.

Broadly, the deep split between Science and Mathematics I see as primarily a 1900-1930 affair, although there were conscious efforts by mathematicians to emancipate Mathematics from Science, as I learn from Lutzen, in the nineteenth century already.

I see my own efforts, whether coherent or incoherent, personally and in other ways (now that I am making a bid for tenure at Stanford for my Scientific accomplishments) to be seeking a *unity* again between Mathematics and Science. I have deep *disregard* for the division between Mathematics that is *Pure* and *Applied*. I will dispute the value of this division. The deepest issues that strike me are precisely the particular role that Mathematics plays in human understanding of Nature itself. This role is not clear at all in my view, and until Four-Sphere Theory succeeded, which is a pure mathematical physics that is a serious theory of Nature and simultaneously formulated in pure mathematical concepts quite consciously and not by accident. I am trained in pure mathematics even though I had held industry roles in mostly Scientific activity. I consider myself an *experienced scientist*. But I am interested now in the issue of what sort of thing our collective knowledge is of Nature at a fundamental level and what role Mathematics plays in this understanding. Four-Sphere Theory's success allows me confidence that this role is quite different and quite a bit deeper than all extant scholarship has allowed us to appreciate in the past three centuries.

12. Can There Be Science Without 'Mathematical' Rigour?

Regardless of whether you are in agreement or disagreement without my own confidence that Four-Sphere Theory is (a) successful as revolutionary fundamental physics, and (b) that it is a rigorisable (this will be sensible to mathematicians who know the work of Michael Atiyah and Isadore M. Singer and others), and (c) it successfully displaces QED, GR, and Expansionary Cosmology. I make these claims seriously and not frivolously.

Regardless on where you stand in this debate, there is seriousness in substance to the question of what, if anything, we can say, we *know and understand* about Nature without *mathematical rigour* in the substantial sense, i.e. the sense in which all the concepts are precisely defined without mysticism and leaps of faith and invocations of special privileges of particular scientific theories. Here I am specifically interested in challenging notions of *quantum field theory* and quantum theory more generally.

I will immediately reveal my prejudice here and suggest that when one examines scientific theories deeply, especially ones that are not *phenomenological*, i.e. provisional and with pragmatic interest in providing some sense of an impossibly difficult situation, but theories that are established, then issues of mathematical rigour cannot be separated from what we can safely include in our 'knowledge set' about the universe, existence, Nature, 'all of Creation' that was done not by the will of Man. I am not being *anachronistic* here; I am deeply influenced by the English Romantics intellectually, and so personally consider the division of Man and Nature to be operative in my view of all phenomena that are 'objectively real'. In fact, my attention had been refocused in recent years to *psychology* rather than physics.

Mathematical rigour on many topics of purely mathematical interests is not so important in this business. What is important is the role of mathematical rigour in our scientific understanding of what there is to know about Nature, and our confidence of this knowledge.

13. The Limits Of Empiricism Is No Longer A Philosophical-Academic Question

I claim that there is a literal vast purely electromagnetic fourth spatial dimension in the *objective universe*. And therefore we will *never ever* have any fundamental physics based only on observation and measurement and we have to rely on mathematical rigour to know all of existence. So this question of mathematical rigour is no longer a matter of secondary concern to Science, and not only physics but Chemistry and Biology are affected directly. Quantum Chemistry is not the right answer; electromagnetic *phenomena* are driven by processes that we *have not even theorised* and are *inaccessible* by current standards of measurements and instrumentation. There are *untheorised* objectively real phenomena involved in why proteins fold at all for example, and vast parts of the universe are objectively real but not accessible by current standards of theory-building. So what has been called 'mathematical rigour' is not a matter of subjective taste any longer but necessary to produce scientific theories that have any remote possibility of being *true* about the universe.

That is what I am trying to convey to my beloved people the human race, that there are more things in Heaven and Earth than are dreamt of in your philosophy. And these things must be understood, verified, and absorbed into our enterprise of Science.

14. The Universe Has Exactly Four Electromagnetic Dimensions Not Less And Not More

I am not an *enthusiast* of large numbers of dimensions. I am an enthusiast for exact truth. There are no spatial deformations (like expansion) in the universe. The universe has four spatial dimensions that are electromagnetic (and these are used by people like Bill Gates for power and other purposes too). The universe does not have 26 hidden dimensions. There are four and only four and nothing less than four and nothing more than four spatial dimensions in the universe. That is the important point. All 6 dimensional theories are *false*. All 26 dimensional theories are figments of imagination without any truth-content. Only four-sphere theory is correct and all other theories are false.

15. I Am Indeed Taking On The Whole World

You see, my dear readers, I am a Romantic, like Percy Bysshe Shelley before me. I am not *trying* to be a hero. I am a hero in the old classical Greek sense *out of necessity* because white people in America are timid and do not *lynch* people they need to lynch like Bill Gates and instead tolerate the white supremacist trash like him. What choice did you leave me? Did I have a choice in this matter? Did you ever think that "Maybe, perhaps, I should lynch this malevolent cunt Bill Gates?" Well c'est la vie. I am Asian and have to make my own arrangements.

16. I Do Not Want To Repeat The Obvious

Bill Gates violated White Law and applied White Power against a non-white American man, myself. Now White Power is not Bill Gates' personal power. It is power of 200 million white Americans. If white Americans do not immediately curtail all power to Bill Gates and punish him for his violation of White Law in this case, I will be displeased and Asia will consider white Americans hostile to Asians and this will lead to war against the United States not by China but all of Asia. If you do not heed my warnings here, you will face the consequences that are as obvious as crystal clear water.

17. Bill Gates Put In Tens Of Billions Into Wars In Asia

Look, American white people, I will be blunt and frank. I am American without a doubt. Bill Gates is not more American than me. He says "Natural Rights are claptrap". Well I am for Natural Rights Security for all eight billion people. Even if there is a small war by United States now in Asia, I will promise to nuclear wipe out all of America within a few months, ok? I am sick of American wars in Asia from 1945. I will consider it a job well done. Ok?

18. Look Bill Gates Is A Worthless Illiterate Criminal

Bill Gates uses black magic against my body and health. Bill Gates uses US War power against an Asian-American, myself, and harms my body meta against Geneva Conventions rules against *Prisoners Of War* and uses Enslavement and Conquest meta against me. I don't give a damn about his 'American Control'. The law is in UN Charter. You want to believe rubbish that's your headache. Unless UN Charter is amended and it is ratified that America has all sorts of control, I am not buying into it. Ok?

19. What Is It About Certain Types Of Mathematics That Gives Us Reliable Knowledge of The World?

I repeatedly return to a set of ideas about two worlds. One is the world of Mathematics. The other is the world of existence, the world of objective phenomena. On one hand, we are, as human beings with our *historical experiences* living in a historical tradition, *habituated* to taking all sorts of platitudes about this relationship between Mathematical objects and their capability to *represent* knowledge of the objective external world and then *internalising these* and *accepting them* as simple pragmatic propositions. On the other hand, this is a matter of profound mystery. I won't give elementary examples of this and just illustrate it thus: you're d'Alembert, imagine, and you ponder the question of a string in tension. You believe that Newton's concepts are serious as a model of the external world. You examine the $F = ma$ law, put a density on the string and then you use tension as another parameter, make this and that assumption, and voila,

$$\frac{\partial^2 u}{\partial t^2} = \frac{\partial^2 u}{\partial x^2}$$

and you are moved by the beautiful formula you have found, you make love to your beautiful lover and tell her of the wonders of your insights, and life goes on.

So what actually happens in this case? Why did you have any confidence that if you let $u(x, t)$ be the vertical displacement of the string then you can actually

expect any of the objects you manipulated, to lead to something that works and gives you displacement of the string that can now be measured and verified?

That is the heart of the question that I am asking, and for which I believe we, the human race, will have a sharp answer. The point is that there is much more substance in the things that you did in *representability of Nature* than has ever been understood in three and a half centuries of modern Scientific history. And it is my intention to seek sure and solid answers to the questions. What is this representability? How much can we trust the representability? It does not matter in the end whether you preen like peacock and love the sound of "I am a *theoretical physicist* darling" that you say to your lover.

20. Stanford Could You Do A Deep Consider For Demonic Harm To Me By Bill Gates?

Stanford University, I have discovered deliberate and deep demonic harm to me by Bill Gates including disgusting and harmful spiders that are poisonous and hurt the body. I need a thorough and high powered consider to assess total damages to my Indian meta and to my personal and professional life.

This Bill Gates is a serious liability to the United States of America and all American White People. Do a good thorough job. I am American and can probably decisively intervene in global conflict that could result but unfortunately all American Institutions will face scrutiny by Eurasia with unpredictable consequences if you do not succeed in settling all issues here swiftly.

Why the United States allowed this Evil Sorceror and Malevolent and disgusting vile filthy low wretched little shit to live past five years of age is a mystery to me. He is a grave risk to the entire American adventure.

21. Natural Foundations of Analysis Versus Physics

Jesper Lützen's beautiful article "The Foundation of Analysis in the 19th Century" tells us about the lost ground of geometry as foundation for Analysis, ceded to natural numbers and arithmetic by 1870.

I will keep pressing my own interest here, and suggest that there is a fundamental need to have clear understanding of foundational understanding of Mathematics *that has representability to Nature* that has never been done at all. In other words, the questions of foundations in Mathematics in the nineteenth century were inward-looking for pure Mathematics and the issue of representability of Nature was put aside for more than a century, and it is of profound importance for the future for both Mathematics and Science. Today I see anarchy in foundations of Science as a result of the failures in clear foundations of Mathematics.

From one viewpoint, it will seem foolish and pedantic to seek to disrupt the traditions established within Mathematics in the past two centuries for formal satisfaction. But unfortunately this is not a formal issue but an issue of how we, the human race, will be able to understand both issues of Mathematics and have precise understanding of Natural Sciences in the future for formal issues of coherence as well as *substantial issues* such as how should human intellect grasp the way in which the external world functions in a satisfactory way?

There has always been a tension in Science regarding this *applied* attitude. But this nomenclature begs the question. What exactly is being 'applied' to anything? The language is glib. What do you mean you took some formal systems and you

think these are contentless – see Richard Feynman's denigrating depiction of Mathematicians in his lectures – and then suddenly some magic happens after you 'apply' it to some physical situation and then you have *confidence* that this 'application' will produce correct predictions of Nature? We ought to be able to do much better than this. *Unless the mathematical formality actually was able to represent some truth of Nature, all manner of 'applications' would yield no valuable predictions in the first place.* So what is wrong with the way we are thinking about 'pure' and 'applied' Mathematics?

22. The Universe Is A Four-Sphere With Curvature $\Lambda = 1.11 \times 10^{-52} m^{-2}$

I have been since 2008 promoting the claim that absolute space of the universe has exact representability as the homogeneous simply connected manifold of curvature $\Lambda = 1.11 \times 10^{-52} m^{-2}$, or equivalently, of radius $R = 3075.69 Mpc$. In other words, this geometry and *only this geometry and no other geometry* is part of the structure of Nature. This is central to the four-sphere theory, and it is a novel theory that I, Zulfikar Moinuddin Ahmed, and no one else before me had made.

In particular I am saying that Albert Einstein's model of the universe is wrong. In particular I am saying that every single model of space and time that is not $S^4(R = 3075.69 Mpc) \times \mathbf{R}$ is wrong, and only this model of the universe is correct. That is fundamental to my Four-Sphere Theory.

Every measurable subset of the mathematical model, $A \subset S^4(R = 3075.69 Mpc)$, as a consequence of my claim exactly represents some region of absolute space 'out there' in the universe, and there is nothing else but these. All regions of existence and Nature are fully accounted for by Lebesgue-measurable subsets A of the mathematical object $S^4(R = 3075.69 Mpc)$ and there are no other regions of existence 'out there' that is not accounted for by my claim.

This is an example of the sort of thing I mean by representability of Nature. This is my Scientific Theory, at least an elementary part of the theory.

Either I am right in these claims, or I will be wrong. I have shown a great deal of evidence that I am right. And this is a far sharper claim about representability of Nature than anything by Sir Isaac Newton or by James Clerk Maxwell. And so this is sharper Science than their theories.

Please note that there is no coercive effort in my work. I do not have any coercive plans to ensure acceptance of Four-Sphere Theory. This is very important to understand, since in the current age there are all sorts of ideas about how scientific theories are established. In the *long run*, consensus formation will be guaranteed if I am indeed right, and all of humanity will accept that four-sphere theory is true *about Nature*. Or there will be some rational basis for rejecting my theory. I am confident that the former will be the case and for millions of years in the future, four-sphere theory will stand strong as the final word on geometry of Nature.

The basis for Scientific theories is not based on *authority* or *coercion* but by methods that respect the natural right of Liberty that is inalienable for all human beings. If I am right, and I certainly am sure that I am, then I will be immortal for this claim because it moves human understanding of Nature in strong way forward.

I want to make the analogy of my claim to "Pacific Ocean exists". This is easy to verify by going to California and going to the beach. My proposition is similar; I believe that it will be as clear in the future that the geometry of absolute space is a four-sphere and nothing else. I am immortal because I am right and not because

I am *clever*. It does not matter for this whether I am clever or dimwitted. What matters is whether I am right or not.

23. Stanford I Am Infinitely More Valuable Than Bill Gates

You do not need the filthy money of a white supremacist charlatan like Bill Gates. I gave you such a nice advance in boundary values of holomorphic functions up to the boundary. Bill Gates is a college drop-out charlatan, a criminal man without any sophistication of cultivation who offers nothing but problems. Why don't you just totally destroy the knave and give me full professorship over his grave? Don't be stupid, Stanford, he offers you a lot less than I do. I am an immortal genius with my four-sphere theory. Who is Bill Gates? He's a ghetto little mezza-calza who lies nonstop and only sold third rate software. Forget him. Burn down his Empire and destroy him physically. Go with Zulf and drop Bill Gates permanently.

24. Ah English Literature

My command of English Literature is not as good as it ought to be. I did write about Milton's *Paradise Lost* during sophomore year at Princeton, but I was rather less strong then in my adherence to Romanticism than I became later in life. I am reading M. H. Abrams on Romanticism still and have some sense for development of the Grail Legends. I don't really like Charles Dickens and the period after Romanticism at all. They call this totally drab and uninspired period *Realist Period* but I do like the Modernists. I love Virginia Woolf and Eliot and James Joyce, and Rilke and the German writers Thomas Mann, Hermann Broch (who is vastly underrated) and Robert Musil, and I understand *The Waste Land* like the back of my hands, very strongly. It's my poem. I don't care for French literary theory. I am far more classical in my literary judgment and consider Shelley to be the greatest of the Romantics. England did well with being totally illiterate during Julius Caesar's Conquest and eventually producing Shakespeare. It's good overall what English literary genius had produced.

Now Romanticism is truly a marvelous period, one close to my own heart, and from the Romantics I had gained the dauntless courage that still allows me to survive and keep going. The spirituality of Romanticism is exquisite, and the boundless celebration of the deep individuality. I always marvel at the crispness of the moral vision of Shelley in *Prometheus Unbound*. America is rather primitive in the cultivation that is promised with Romanticism but somewhere along the way, American taste was damaged with the commercialism. There is hope for America yet. There is always hope for America while I am here. I believe America is Exceptional for this reason alone.

25. Beyond Liberty Contra Tyranny

That I am a Romantic to the very core of my soul is without any doubts. And for that reason, I cherish my Liberty, and am forever an enemy of Tyranny wherever it rears it's monstrous head. But what is substantial after Liberty is preserved of course is what one does with the Liberty gained. I am profoundly angry and agitated that the United States Government had not totally wiped out this horrible ugly low vile savage monstrous evil of Bill Gates long before my arrival to the United States in 1987, for he is unworthy to live at all. He deserves not only death but a horrible painful death. And this you might consider a Romantic response to, of

Liberty against Tyranny. And what a vile man he is, seeking my Enslavement and clamping down Conquest meta against myself.

Now on to more substantial Romantic optimism about the greatness of Liberty, and these are the positive activity of the free peoples of the world. Freed of all obligations, I worked on Four-Sphere Theory, and then on Universal Human Moral Nature. These are profoundly great achievements, and my Romantic Spirit was in good movements during my efforts.

But there is something else about Liberty that is more interesting, a generalisability. It is Liberty of individuals that produce the greatest genius in all people everywhere. And that is the source of all human genius. There is of course the the slow acquaintance with Tradition, but this is only valuable when pursued with perfect Liberty. This seems either banal or unsubstantial to many but it is true. It is not slavish engagement with Tradition that produces progress, but a joyful absorption. Romanticism is primarily about a trust and a veneration of the unique within the individual. This is not easy at all. There are forces always that denigrate people by some means – not always money but something else. Today it is money more often but only because it is a Primitive Age of Man, one that can be overcome when it is realised that Money is only a luxury in a low technology state, just as clean drinking water was a luxury once upon a time. And then money too will be like tap water, and our concerns will move on to other things. This hope, this is *Romantic* as well. Romanticism is not about flight from reality but the extraordinary hopes within Man being expressed to transform the world.

26. Starcraft II Very Hard Defeat Jan 23 2022

I have been playing Starcraft II with the goal of gaining deeper understanding of how habituation improves skills at a steady pace. I am in the skill level now that I can routinely defeat AI at Harder level and not able to defeat the AI at Very Hard.

I want to share with you my latest game. It is definitely habituation that is required to gain the precision needed to gain levels of skills. I am not really competitive here but I do pay attention to the time it takes to gain some skill improvement.

27. Zulf Comments On Aesthetic Facts

I enjoy reading M. H. Abrams. I am not interested in becoming any sort of professional literary critic at all. But I do think that it matters to my personal evolution and my personal *meaning* in my short existence to pay attention to something like *aesthetic facts*. Life continuously throws us into the land of the banal and the meaningless and the routine, and life would be unbearable without constant personal expansion and personal satisfaction in understanding what had been, and what is fundamentally *important* to me, to us generally, of those sorts of facts that give some deeper insight, and transform us, allow us to see something of our fundamental purpose in *this life*, so that our deaths will be meaningful.

Aesthetic facts have special privileges in these matters of individual meaningfulness, and of individual self-regard as well.

This is what Abrams brings up in *The Mirror And The Lamp* quite immediately. He says the task of criticism is to order and justify *aesthetic facts*, and to clarify their interpretations.

What is without a doubt for me is that the task is a secular version of old religious examination of sacred texts. And I can assure my dear reader that this is indispensable to understand oneself and one's troubled – or serene – times and one's own place in *existence*. We are all, we human beings, aesthetic spiritual beings in the end. For many of us religious edification is nourishment enough. For others, like me, examination and absorption of *aesthetic facts* is no matter of frivolity and entertainment but roadmap of our horizons, internal and, for the fortunate ones, external worlds.

That I could not have survived to this age at all without this personally, to know that Aeschylus' Prometheus might have been far more important to me than my credit score and American Economy, these things are not difficult to know. That without aesthetic education, just as Friedrich Schiller suspected, I would not know who I am, and continue to do what I do every day, to retain always highest Hope and Optimism, without even significant financial earnings coming into my bank account, these things are not difficult. And so all judgments about these issues by the various powers that have influence have to be always disregarded.

I hope my readers are wise enough to know these things about life on Earth. If you did not, learn it from me now.

28. Bill Gates Will Surely Perish Before I Do

FBI asked me to not 'threaten' Bill Gates. The worthless little hick illiterate scrub has decided that he has sufficient power to kill me. He's cut into my eyes and has been attempting to 'crush my skull' by various powers. He will not succeed. In fact China has decided to put in power to keep me alive. So he is too arrogant and too stupid to succeed because my Deep Interior is Asian, and China is more than powerful enough to keep me alive. I will be damaged of course, but I will live.

He, Bill Gates, however will not survive this conflict. It will not be because I am going to Jason Bourne by jumping around in helicopters with sniper rifles near his physical location. I do not have any interest in doing that.

There are other reasons. You see, I have actual experience with survival crises. I was hobo for six months and almost died in winter in New York City in 2008. I will survive his efforts. He will in the end be killed not personally by myself but my allies, Eurasian powers most likely. United States Government ought to have killed him a long time ago. Most likely the government is corrupt and will not do this. But I will continue to survive.

I hope Stanford comes through with a full professorship and tenure. I do believe they want to. But they are too white and cannot be trusted to deliver. In these situations with a dedicated murderous white supremacist butcher, white people have always been unable to deliver. I don't have 100% faith in Stanford because white people have never had serious intent to do what is necessary in history of genocide of native Americans, in wars in Asia, in numerous cases where the criminal was white and evil and the victim non-white, white people have always been tepid and did not deliver.

One hopes this will change one day, but one cannot actually expect this with confidence. But Bill Gates will not be making it. He will perish before I do.

29. Arbitrary Spinor Fields On Four-Sphere

I am more and more fascinated by the history of the notions of arbitrary functions. Having born in 1973 in Bengal, and having lived in America from 1987, I forget too easily that years ago, at least before 1742, the world did not know how to precisely define functions at all. Leonhard Euler changed his mind from defining functions as analytical expressions to the more familiar definition of functions. Suppose $[a, b] \subset \mathbf{R}$, and $f : [a, b] \to \mathbf{R}$ be an arbitrary function. I learned already in high school, and perhaps this was due to sharpening of my education at Ohio State University Ross Program, that the key point of functions $f : X \to Y$ is the uniqueness of the value $f(x) \in Y$. In other words, the mapping of sets is in my era quickly absorbed by young boys. Only time and experience shows us that functions $f : [a, b] \to \mathbf{R}$ need to have some constrained. Whether by fortune or destiny, I was working at Lehman Brothers by 1995. And was suddenly thrust into a world where $f : [a, b] \to \mathbf{R}$ were continuous and nowhere differentiable. I was not worried about the time not even two and a half centuries before, where people did not have Ito formula. Sample paths of Brownian motions were part of standard fare for me throughout life. In fact, Paul Levy had already produced one of the most beautiful theories in all of Mathematics, the theory of Levy Processes which provided a finer taxonomy of functions $f : [a, b] \to \mathbf{R}$ arising as *sample paths of Levy Processes* than say Jean Baptiste Joseph Fourier could have even contemplated in 1811. I want to put this in context. By 1995 I was surrounded by hundreds of Wall Street Quants for whom the idea of $f : [a, b] \to \mathbf{R}$ meant something like sample path of a Levy Process with random jumps and the quants were examining the models of speculative price movements from these models.

That's quite something. Peter Gustave Lejeune Dirichlet, who moved to Paris because Germany did not have many great mathematicians (besides Gauss) in 1822 was foremost of the world and studied Augustin Louis Cauchy's *Cours d'Analyse de Ecole Royale Polytechnique* from 1823 where continuous functions were introduced after Bernard Bolzano in 1819 of course forgotten because he was a philosopher-theologian in Prague. In other world generic Wall Street junior quants in 1995 were making a living dealing with models where random jumps, Gaussian noise, nowhere differentiability of the continuous part were routine and all people hailed Ito formula in various versions. Functions that were not even admitted into existence by Fourier in his imagination were hacked and sliced by large numbers of professionals in industry in 1995. It's marvelous to see this put in context. Cauchy's definition of the integral for continuous function was expanded in 1851 by Riemann and then revolutionised by Henri Lebesgue in 1902-5 and then, and this part is not as clear to historians of Analysis as it ought to be, that with Norbert Wiener and Kiyoshi Ito, we had clear senses of stochastic integrals where dt itself gets replaced by dX_t.

It is today absolutely clear that stochastic integrals is pure *Analysis* and not really a separate branch. All sorts of totally impossible to draw geometrically functions $f : [a, b] \to \mathbf{R}$ literally became normal by 1995. The issue of what functions ought to be was clear from extremely ready example from life.

You have to understand that Zulf is quite worried that my baby, my beautiful four-sphere theory might not survive if I did not consider *measurable spinor fields* on the four-sphere right away.

For historians of Science in the future, pay heed here, because I will mention a definition that makes measurable spinor fields on the four-sphere that will be clear.

We recall that $\sigma_1, \ldots, \sigma_{16}$ are Killing spinor fields on the four-sphere that parallelise the spinor bundle. These are smooth. Now we consider measurable functions $f_j : S^4 \to \mathbf{R}$ and just keep the same basis of spinor bundle.

An arbitrary measurable spinor field will be just

$$\sum_{j=1}^{16} f_j \sigma_j$$

and I will introduce *measurable spinor fields* as the objects of physical universe right here right now.

Now historians will know that I, Zulfikar Moinuddin Ahmed, was the man who defined what things that can have existence in the universe right here in an immortal moment with precision and grace for all of eternity.

30. Problem 2

Suppose $f : \mathbf{N} \to \mathbf{C}$ be a bounded function and $M_f \in L(\ell^2)$ be

$$M_f(a_n) = (f(n)a_n)$$

(a) What is the spectrum of M_f. The spectrum is $\sigma(M_f) = \{f(n) : n \in \mathbf{N}\}$. For any $z \notin \sigma(M_f)$ consider the map $R(a_n) = ((f(n) - z)^{-1}a_n)$. This is bounded, by $\sup_n |f(n) - z|^{-1}$ so it's bounded.

(b) Sufficient condition is $f \in \ell^2$ and then $M_{|f|^2}$ is self-adjoint and limit of finite rank operators . Necessary conditions I do not know.

(c) All points of spectrum are eigenvalues as if we let e_n be the n-th coordinate vector then $M_f e_n = f(n)e_n$.

31. Problem 4

Let X be reflexive Banach. Then $X = Y^*$ with $Y = X^*$. The Banach-Alaoglu theorem says B is compact in the weak-* topology $\sigma(Y^*, Y)$ but this is the weak topology $\sigma(X, X^*)$ so B is weakly compact.

31.1. **Problem I.4(c).** Although the whole space X is not metrizable in weak-* topology $\sigma(X = Y^*, Y)$ with $Y = X^*$ the ball B is, and this ensures that I.4(a) implies subsequence convergence.

31.2. **Problem I.4(b).** The boundary $|x| = 1$ is compact only for finite dimensional X. In infinite-dimensional case the closure of $\{x : \|x\| = 1\}$ is the entire ball B.

32. Problem I.3

Suppose X, Y are Hilbert spaces. Prove or disprove the following.

(a) $T \in L(X, Y)$ is a bijection but the set theoretic inverse T^{-1} is not bounded.

(b) $T \in L(X, Y)$ is injection but the there is no left inverse $S \in L(Y, X)$ so that $ST = Id$.

(c) $T \in L(X, Y)$ is a surjection but there is no right inverse.

These are all issues of the Open Mapping Theorem. For (a) the Open Mapping Theorem, which says that surjective T are open, ensures that T^{-1} is continuous, and therefore bounded.

33. I Do Not Understand Why People Politely Repeat To Bill Gates "You Are Not Allowed"

I repeatedly hear people saying in meta to Bill Gates "You are not allowed" to do something. I do not understand what is the intelligence in politely saying anything to him. He is a brutal savage barbarian evil lawless scumbag. The only way to handle these sorts of people is lethal overwhelming force and Government-Is-Leviathan. What do you think you accomplish by meek polite dealing with these hardened habitual racial murderers and hard-core criminals? Why doesn't the United States Government use lethal force? Bomb him and destroy him physically. What else do you think could have any effect. There is not a murderer on Earth who is more criminal than Bill Gates. He is totally deeply lawless, evil, savage,brutal and criminal. Why don't you use ordinary intelligence and bomb his estate relentlessly and totally destroy him?

34. Problem II.5: Resolvents Are Holomorphic

The goal of this problem is to consider the operator

$$L = -\frac{d^2}{dx^2} + V$$

where $V \in L(L^2(\mathbf{T}))$. The space is a circle $\mathbf{T} = \mathbf{R}/2\pi\mathbf{Z}$. The operator is defined then as a bounded mapping

$$L \in L(H^2(\mathbf{T}, L^2(\mathbf{T}).$$

Then we consider the resolvent operator

$$R(z) = (z - L)^{-1}$$

for $z \in \mathbf{C}$ with the property that $z - L : H^2(\mathbf{T}) \to L^2(\mathbf{R})$ is invertible.

Our goals are to prove (a) $R(z)$ is always meromorphic, and (b) $R(z)$ is holomorphic in some half-plane $\Omega = \{z \in \mathbf{C} : \Re(z) < -C\}$.

How shall we do this? Well we are going to just relax and explore the situation first because we're not young any more. Let's return to elementary complex function theory for a while. There's not much rush, since although we seek tenure at Stanford, we're not really trying to be hotshots in Analysis Research. Instead, we are interested in just gaining some better understanding of these sorts of situations.

I remember, years ago when I was at Princeton taking some course on Riemann Surfaces with Jean-Francois Burnol. Boy, he gave me such a hard time seeking rigourous details on all manner of nonsense on arguments regarding holomorphic and meromorphic functions.

So let us get our bearing. The way I gained intuition about complex analytic functions is quite simple. I said to myself, let's say I have a function $f : \mathbf{C} \to \mathbf{C}$. I then treat it like an ordinary function, and use *real* variables z and $\bar{z}$. Then I get

$$f(z, \bar{z}) = f_1(z, \bar{z}) + if_2(z, \bar{z})$$

Then I decide that f is holomorphic if and only if

$$\frac{\partial}{\partial \bar{z}} f = 0$$

everywhere I look in the domain.

Now you might object that this is not really the right definition and so on. I don't really care, because it's equivalent to all sorts of power series expansion and Cauchy-Riemann equations and all that jazz.

It's my intuitive way of dealing with holomorphic functions, that these are multivariable functions without any $\bar{z}$ dependence.

The second thing I remember from complex analysis is that you should formally manipulate power series and take Taylor series all you want and never worry about radius of convergence until the last minute.

So in the spirit of total disregard for rigour, and penchant for formal manipulations that are not even remotely justified, let's take a look at the resolvent.

You go something like this:

$$R(z) = \frac{1}{z - L} = \frac{1}{z}\frac{1}{1 - L/z}$$

Then you say well obviously this is

$$R(z) = \frac{1}{z}(1 + (L/z) + (L/z)^2 + \cdots + (L/z)^n + \cdots$$

Then then you say well, put some sort of norm on the L/z:

$$\|R(z)\| \leq \frac{1}{|z|}(1 + \|L/z\| + \cdots + \|L/z\|^n + \cdots$$

We'd be just fine if $|z| > 0$ and $\|L/z\| < 1$ for convergence of the series. And then we say, "I don't see any $\bar{z}$ in the expression so it's meromorphic."

That's when you know that Jean-Francois Burnol would be seething with all sorts of steam coming out of his ears and he will totally turn all your submitted problem set with so many red pen comments that it's an entire tome saying that this is totally unrigorous and unacceptable and so on.

Examination of the norm condition tells us that things are good for norm-convergence of the series

$$R(z) = \frac{1}{z}\sum_{j=0}^{\infty}(L/z)^j$$

which will produce a bounded operator with norm-convergence from the partial sums so long as $\|L\|/|z| < 1$. Therefore we have holomorphicity of $R(z)$ for $|z| > \|L\|$. Then we can just pick some half-plane in $|z| > \|L\|$ for Ω and get holomorphic $R(z)$ there. This is a nice special situation where formal manipulations produce a good solution.

But Jean-Francois Burnol was right to chastise the young intrepid Zulf for my tendency to be lazy during undergraduate years because most problems do not respond well to flinging rigour to the winds and manipulating all sorts of formal expressions without a care in the world about whether they even make any sense hoping that lemmas will fall from the banyan tree and give us the right answer. But who cares? If it works here, do it this way.

35. Why Bill Gates Is The Worst Disaster For Science And Mathematics And Intellectual Life

Bill Gates has no talent in mathematics or science whatsoever and is a *college dropout* who lied about his SAT score to the world and *is a glib charlatan without intellectual talent*. But he pretends to be able to judge people who are actually

talented in Mathematics and Science and pretends that he knows better who is good and who is not than *Harvard* and *Stanford* faculty. He has an agenda to ensure that only white people are given tenure at top United States Universities.

You see the problem is that Mathematics and higher level physics and every other pursuit demands dedication and devotion and love and interest of many years. Bill Gates is a total charlatan who pretends to read books that he does not read, and he has *absolutely no intellectual talent worth a dime*. His destructive path racialising Mathematics and Science and academic work will produce total disaster in all areas that demand a great deal of talent and devotion.

The world is not only better off without his particular white supremacist *agenda*. The world is better off with him completely destroyed and dead. No one needs this sort of wretched vile savage scumbags at all. He should be literally destroyed as soon as possible.

36. Problem II.4

Let $\mathcal{D}'(\mathbf{T})$ be the distributions on the circle. This is the dual of $C^\infty(\mathbf{T})$.

The topology on $\mathbf{D}'(\mathbf{T})$ is the weak-* topology. This is the smallest topology where for every $\varphi \in C^\infty$ the map $E_\varphi(u) = u(\varphi)$ is continuous.

The problem here is a matter of proving that certain sorts of operations on $C(\mathbf{T})$ extend to $\mathbf{D}'(\mathbf{T})$ and others do not.

I have never done these sorts of problems at all, so I will just putz around for a while trying to understand the situation.

I want to get a feel for what these sorts of extensions are all about. First let us remember how $C(\mathbf{T})$ is thought of a subset of $\mathcal{D}'(\mathbf{T})$. Given some $g \in C(\mathbf{T})$ we consider $u_g \in \mathbf{D}'(\mathbf{T})$ defined by

$$u_g(\varphi) = \int_{\mathbf{T}} g(x)\varphi(x)dx$$

Now since I have no serious idea about how to prove (a) multiplication has no extension, (b) convolution has an extension that is continuous, let me just examine various quantities involved.

Let's take a look first at (b) because this looks like a positive result.

Now

$$u_{f*g}(\varphi) = \int \int f(x-y)g(y)dy\varphi(x)dx$$

Let's see, what if we switched the integrations?

$$u_{f*g}(\varphi) = \int \int f(x-y)\varphi(x)dxg(y)dy$$

That's

$$\int (f*\varphi)(y)g(y)dy$$

Then we pretend that $f * \varphi$ is a test function and get

$$u_{f*g}(\varphi) = u_g(f*\varphi)$$

This is promising but not any clear path to proving any sort of continuous extension result at all.

36.1. **The Laborious Slow Path.** Since these continuous extensions of operations from $C(\mathbf{T})$ to $\mathcal{D}'(\mathbf{T})$ are totally obscure to me, I decided to just unravel the definitions and dissect them to gain some insight.

The first question I asked is: *What does it mean for some sort of bilinear mapping*

$$b : C(\mathbf{T}) \times C(\mathbf{T}) \to C(\mathbf{T})$$

to have any sort of continuous extension

$$\tilde{b} : \mathcal{D}'(\mathbf{T}) \times \mathcal{D}'(\mathbf{T}) \to \mathcal{D}'(\mathbf{T})$$

at all?

Continuity of $\tilde{b}$ means that for any open set $V \subset \mathcal{D}'(\mathbf{T})$ the preimage

$$\tilde{b}^{-1}(V) \subset \mathcal{D}'(\mathbf{T}) \times \mathcal{D}'(\mathbf{T})$$

is open, and continuity of b means that for any open $W \subset C(\mathbf{T})$ the set

$$b^{-1}(W) \subset C(\mathbf{T}) \times C(\mathbf{T})$$

is open.

What does it mean for $W \subset C(\mathbf{T})$ to be open? The implicit assumption that I carry is that continuous functions have the sup-norm topology, so this might mean that W is a union of sup-norm balls, and $B(g_0, \epsilon) \subset W$ where $g_0 \in C(\mathbf{T})$. Here

$$B(g_0, \epsilon) = \{g \in C(\mathbf{T} : \|g - g_0\| < \epsilon\}$$

Let's see, so continuity of b means, substantially that

$$b^{-1}(B(g_0, \epsilon))$$

can be covered by a union of cylinders $B(g_1, \epsilon_1) \times B(g_2, \epsilon_2)$.

Now the continuity of $\tilde{b}$ is a different matter, because the open sets are not unions of norm-balls; they are unions of sets like

$$N = N(\varphi_1, \ldots, \varphi_K, \delta_1, dots\delta_k) = \{u \in \mathcal{D}'(\mathbf{T}) : |\langle u, \varphi_k \rangle| \in (a - \delta_k, a + \delta_k)\varphi_k \in C^\infty(\mathbf{T})\}$$

And the continuity of $\tilde{b}$ amounts to

$$\tilde{b}^{-1}(N) = \bigcup_{\alpha,\beta} N_1(\alpha) \times N_2(\beta)$$

where $N_1(\alpha)$ and $N_2(\beta)$ are sets of similar form to N.

*Let us just assume that there is some compatibility of sup-norm topology of $C(\mathbf{T})$ and the weak * topology of $\mathcal{D}'(\mathbf{T})$.*

*We might think, "Well, looks like the map $b : C(\mathbf{T}) \times C(\mathbf{T}) \to C(\mathbf{T})$ has the property that weak * open sets W of $C(\mathbf{T})$ has pre-image $b^{-1}(W)$ that's a union of weak * open sets in $C(\mathbf{T}) \times C(\mathbf{T})$ and we could use some sort of Hahn-Banach theorem to extend the functionals defined on $C^\infty(\mathbf{T})$ by $C(\mathbf{T}) \subset \mathcal{D}'(\mathbf{T})$ and this will allow us to conclude all the weak * neighborhoods $V \subset \mathcal{D}'(\mathbf{T})$ can be pulled back to unions of weak * neighborhood products in $\mathcal{D}'(\mathbf{T}) \times \mathcal{D}'(\mathbf{T})$.*

*Let there be no question that I am not sure yet what is happening here. The new idea that occurred is that we should examine the compatibility of the sup-norm topology of $C(\mathbf{T})$ and the weak * topology neighborhood bases, that we need some sense of whether sup-norm continuity implies weak * neighborhood continuity, and there is some sort of thing we could do with Hahn-Banach theorem to extend functional.*

In other words the progress here is some vague and nebulous ideas *that are new and no clear mathematical proof in the horizon of anything substantial.*

36.2. **Letter To Stanford.** *Dear Stanford, For Fall 2011 Analysis Qual II.4 I am quite lost. I realise that distribution theory, really invented by Sergei Sobolev in 1935 and later developed by Laurent Schwartz, from work on solving the Cauchy problem for hyperbolic equations, is quite important. But I am still quite confused about the issue of relationship between the topology of C(T) and the weak * topology of D'(T).*

Instead of giving a clear and sharp solution to the problem, I have given a vague, confused meandering account. There is no mathematical proof yet. But there is a certain artistic quality that might be considered haunting, and confused, meandering, and nebulous a sense of delirium like being on psychedelic drugs, a sense of purposelessness of existence, a certain ennui, a certain tinge of nihilism.

Thanks, ZULFIKAR MOINUDDIN AHMED

37. Zulf Will Turn To Haim Brezis Since Laurent Schwartz Tomes Are Unavailable

It is clear to me that there is a jambalaya if I do homebrew on these issues of continuity of extensions from $C(\mathbf{T})$ to $\mathcal{D}'(\mathbf{T})$ of any operation. The hope is that Laurent Schwartz had worked out these issues and that his tomes on distribution theory or Haim Brezis presentation will enlighten us on these.

Let me repeat here my motivation for even considering distribution theory important in my life. And that is my conviction gaining strength that since Nature's fundamental law is the Ahmed-d'Alembert Law, or S4 Electromagnetic Law, that is a classical wave equation *on spinor fields on four-sphere of radius $R = 3075.69Mpc$, all the* distribution solutions *are likely to be* physical.

Let me quickly remind my dear reader about meaning of terms. I am a Scientist with many years of experience in Quant Finance, and many problems of signal processing and proteomics too, and as an experienced scientist, I am quite a bit more interested in Scientific Theories about external world, Nature. *When I say that such and such a thing is* physical *I mean that there are features of the objective external world that is represented by the thing.*

I began to think about this yesterday, January 25 2022. I want to make distributions part of the Four-Sphere Scientific Theory. This means that I want to incorporate certain distributions to be physical in the theory.

I know this seems like this is beating a dead horse but it is a very important issue so I will keep repeating it. In my personal assessment, the fact that in macroscopic physics the sole law is a classical hyperbolic equation leads naturally to the expectation *that distributional solutions are part of nature and not just mathematical formality. And therefore I expect that (a) experimental physicists will discover direct evidence of non-function distributions in nature, (b) not only the 'classical' function solutions of wave equations but also the generalised function or distribution solutions will exist in measurable ways.*

The most important distribution spaces for four-sphere theory will be $\mathcal{D}'(S^4)$ and $\mathcal{D}'(\Gamma\Sigma S^4)$. These are duals of the smooth functions and smooth spinor fields on the four-sphere. They will arise as spaces where some solutions of the fundamental law, the Ahmed-d'Alembert Equations, live.

The distinction that is substantial here is a new principle that I am developing for my four-sphere theory. I had formulated the fundamental law for C^2 spinor fields originally, following tradition in Maxwell equations, from 2018. But thinking

through the issues further, and as I gain more familiarity with history of analysis, it is becoming clearer to me that there is no reason to exclude distributions from the physics theory at all. Why should nature care only about functions and fields the way that we human beings have devised them. Nature does not need to respect the clarity of mappings from space with a single value at a point at all. We know from the success of Maxwell's electromagnetic field theory that the function approach yields some success, but now I want to press the case that these might be a partial theory of Nature, and that all distributional solutions *are also physical.*

I do want to re-iterate the thought process here. I can ask: When I discover that the fundamental law is a hyperbolic wave equation for all of Nature, should I not seek the most natural mathematical space for the equation? *In other words, there is no fundamental reason for nature to be described in terms of distributions at all. I don't advocate this but simply include distributional solutions to the scientific theory.*

Although distribution theory seems quite far removed from our function concept, it is not not so unnatural from the point of view of the fundamental law itself.

Now I am a novice in distribution theory, so I am not interested in claiming technical mastery which I do not have. But I am a very good scientist, and I am quite confident that Nature will contain physicality of distributional solutions. At the moment I do not have specific suggestions for experimental checks on these.

Haim Brezis textbook does not give us exactly what we're looking for. I will give up for now and get a copy of two of Laurent Schwartz' books. I am especially intrigued by his decision to write Mathematics For The Physical Sciences. *He died in 2002, a tremendous loss for the world, and Sergei Sobolev died too.*

Fine, I will remove distribution theory from my list of useless technical mumbo-jumbo and learn about these seriously. I am shameless regarding my opinions. I can assure you that if not for four-sphere theory's naturality I would not have been motivated at all to rush to distribution theory. Sergei L. Sobolev and Laurent Schwartz might have hit upon something that will enhance the immortal genius of Zulfikar Moinuddin Ahmed. *Now when that happens, things quickly get moved from classification of 'useless technical mumbo-jumbo'. I don't mind telling you this. I am a rational man. I care about my immortality.*

37.1. **What Is The Importance Of Distribution Theory.** *The importance of distribution theory in pure mathematics was already noted in 1950 when Laurent Schwartz was awarded the Fields Medal. Using Distribution theory the fundamental solution and existence and uniqueness of all constant coefficient partial differential operators was obtained in the celebrated Malgrange-Ehrenpreis Theorem that was thought to be a project for a future century by Marcel Riesz a few years later.*

However, scientists do not give a damn about this sort of thing. Scientists are overwhelmed by inscrutibility of Nature and have other problems on their mind. They are generally going to be relatively civil and do a nodding of head and say things like 'That's really fascinating.' and 'Is that right, yes it's remarkable.' but if you pay careful attention, they will look at their watches. What they are thinking generally is 'These mathematicians, what sort of esoteric nonsense gives them meaning in their lives.'

What I am telling you right now is that distributions might be scientifically important *meaning that non-function distributions ought to be physically real.* That *is scientific importance.*

I have not read Laurent Schwartz' book on Mathematics in Physical Sciences yet but I am quite confident that I am saying here something different and new. Nature contains distributions, that is what I am saying, and these are not just formalities to prove things about 'classical solutions'. Both Sergei Sobolev and Laurent Schwartz had found something that is actually part of Nature. That *is the exciting issue.*

To me, distributions are mathematically not so nice at all. I like Banach Spaces and suddenly you are thrust with spaces that are duals of small spaces like $C^\infty([0,1])$ *whose duals are gigantic and filled with all manner of horrors and are not Banach Spaces. My intuition about Banach Space duals is already quite weak and suddenly these* $\mathcal{D}'([0,1])$ *do not have Banach Space machinery and I am frankly lost on the technicalities still. It's not exactly a walk in the botanical gardens for me. But if distributions are part of Nature, then all this is justifiable.*

You think this is amusing. Well, it's not that amusing, my dear reader. Life is short. After a finite number of seconds, I will be gone, having shuffled off this mortal coil. I have to be wise about not spending time on total useless technical mumbo-jumbo. No one should waste their precious moments unless there is some deep reason.

38. Challenges Of A Scientific Revolutionary Are Mostly Not Technical

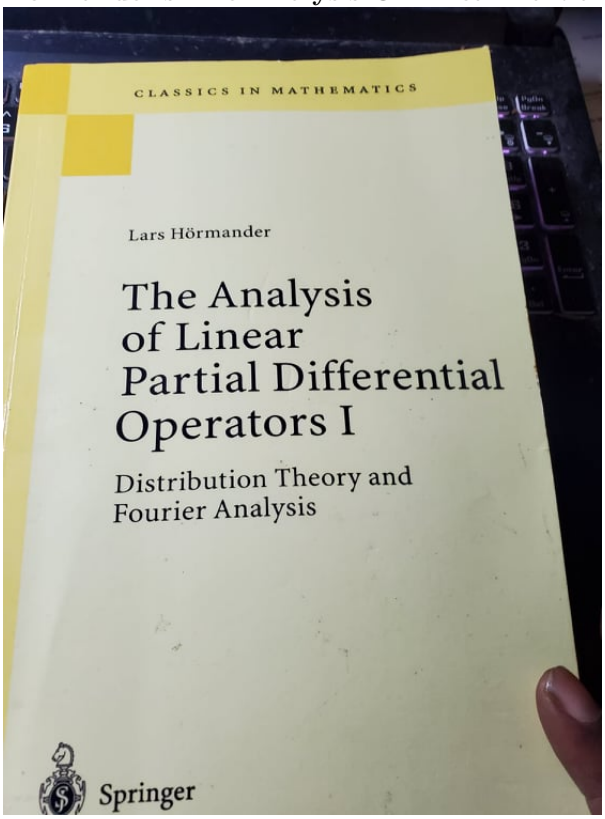
Four-Sphere Theory is successful now with concrete measurement matches, but in the period 2008-2018, the greatest challenges had not been technical. Most of it had to do with mistreatment of people, the insults and jibes and various people's denigrating treatment of my ideas and work including the editors of Classical And Quantum Gravity. *Those sorts of challenges are the norm for all Scientific Revolutionaries from Galileo to Copernicus. I had survived all these challenges without significant earning and then I succeeded, only to be accosted and marked for destruction by Bill Gates for his racial supremacist program with US War Power and US Industrial Power to mince my flesh and rot my flesh.*

As you can imagine, I am extremely unwilling to share my immortal genius in four-sphere theory as a result because it was my own solitary effort and not that of any well-funded group.

Now I am turning to sharpening my Mathematical Analysis by doing Stanford Mathematics Ph.D. Qualification Exam problems, but this is after the fact.

Bill Gates, whose intellect compares unfavourably to most parakeets and parrots, literally thinks that 'Scientific theories are arbitrary' which is by far the dumbest least intelligent, stupidest thing that anyone has ever said about Science. This man deserves to be immortalised for his ignorance, his lack of knowledge and cultivation, his lack of education and his penchant for pretending to be intelligent in self-promotional material when he is dumber than a doorknob. He has a malignant malevolent destructive savage cunning, but it's not exactly intellectual genius.

38.1. **Lars Hörmander's The Analysis Of Linear Partial Differential Operators I.**



I do have actual copies of Hörmander's tomes and there is no question that this man is the greatest master of distribution theory. But I have not mastered the contents at all. The entire chapter 4 is devoted to convolutions of distributions.

Now Problem II.4 is not stated in form that is close to Hörmander's language. Hörmander is quite hard-core and defines $\mathcal{D}'(X)$ *in terms of linear functionals* u *on* $C_0^\infty(X)$ *with existence of* C *and* k *such that*

$$|u(\varphi)| \leq C \sum_{|\alpha| \leq k} \sup_{x \in X} |\partial^\alpha \varphi(x)|$$

Then in the beginning of Chapter 4 he says that for arbitrary $u \in \mathcal{D}'(X)$ *and* $\varphi \in C_0^\infty(X)$ *the convolution*

$$u * \varphi \in C^\infty$$

and this he then uses to define convolution of two distributions $u * v$*.*

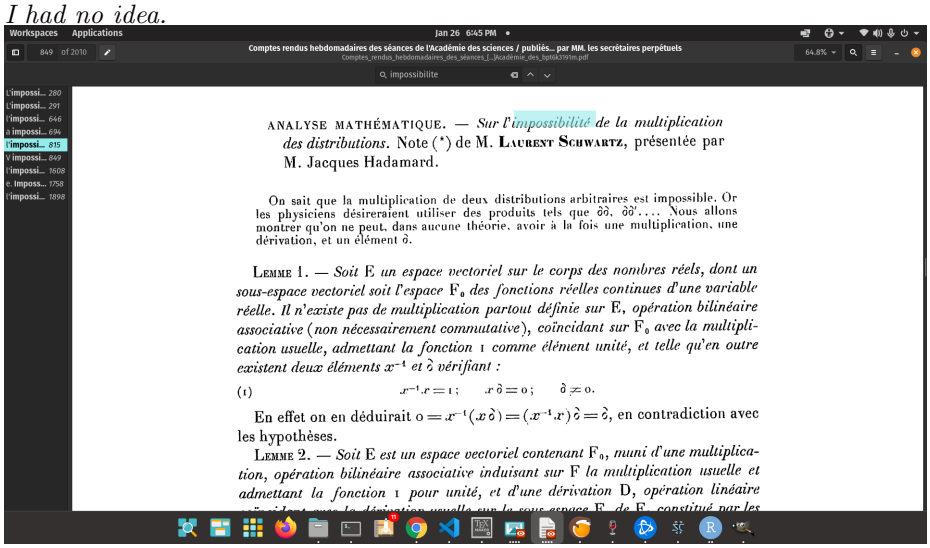
I cannot say that these things are clear to me at all.

I will be quite blunt about this issue. Normally, this sort of backbreaking slave-labour that are probably what these rubber plantation owners make people do I generally leave to other people. But since *my precious four-sphere theory seems to suggest that* $\mathcal{D}'(\Gamma\Sigma S^4)$ *might actually be physical, unfortunately I feel that some* small amount *of effort here might be justified.*

38.2. **Zulf Is Now Really Irritated By Problem II.4.** *Alright, who was the wise guy in the Stanford Qual Committee who decided to make Problem II.4(a)*

impossibility of multiplication of Schwartz distribution? That's a totally obnoxious decision. *How will a graduate student even pass the qualification exam if you take a research paper of Laurent Schwartz from 1954 and make this part (a) of an exam question? That's a totally malevolent dirty trick yo.*

I had no idea.



ANALYSE MATHÉMATIQUE. — *Sur l'impossibilité de la multiplication des distributions.* Note (*) de M. LAURENT SCHWARTZ, présentée par M. Jacques Hadamard.

On sait que la multiplication de deux distributions arbitraires est impossible. Or les physiciens désireraient utiliser des produits tels que $\delta\delta$, $\delta\delta'$, ... Nous allons montrer qu'on ne peut, dans aucune théorie, avoir à la fois une multiplication, une dérivation, et un élément δ.

LEMME 1. — *Soit* E *un espace vectoriel sur le corps des nombres réels, dont un sous-espace vectoriel soit l'espace* F_0 *des fonctions réelles continues d'une variable réelle. Il n'existe pas de multiplication partout définie sur* E, *opération bilinéaire associative (non nécessairement commutative), coïncidant sur* F_0 *avec la multiplication usuelle, admettant la fonction* 1 *comme élément unité, et telle qu'en outre existent deux éléments* x^{-1} *et* δ *vérifiant :*

$$x^{-1}x = 1; \qquad x\delta = 0; \qquad \delta \neq 0. \tag{1}$$

En effet on en déduirait $0 = x^{-1}(x\delta) = (x^{-1}x)\delta = \delta$, en contradiction avec les hypothèses.

LEMME 2. — *Soit* E *est un espace vectoriel contenant* F_0, *muni d'une multiplication, opération bilinéaire associative induisant sur* F *la multiplication usuelle et admettant la fonction* 1 *pour unité, et d'une dérivation* D, *opération linéaire*

This is an extremely esoteric research question which was publishable by Laurent Schwartz himself in 1954, and is totally inappropriate to sneak into a qualifying exam [4].

Of all the no-good spooty sneaky dirty tricks, you just snuck in totally impossibly esoteric technicalities that the masters of distribution theory get confused about and give to innocent young trusting little puppies huh? Zulf is extremely displeased by this deceptive malice and sabotaging of the careers of young people. You ought to be ashamed of yourselves. Your mothers didn't teach you any manners?

38.3. **Zulf Makes The Issue More Outrageously Clear.** *Look, Stanford Exam Directors, Laurent Schwartz literally won the Fields Medal for work on distribution theory in 1950, and* then *four years later, he was still concerned enough about impossibility of multiplying distributions in 1954. What sort of sense did you have when you decided this problem ought to be II.4(a) not even a full question, and the second part (b) is the content of an entire chapter by Lars Hörmander, Chapter 4, of his monumental tome. And he* too *was a Fields Medalist? And you thought that young people just trying to pass a puny Ph.D. Qualifying Exam have to outpace two Fields Medalists to qualify for beginning their doctoral work. And your sneaky language makes it seem that this is a routine exercise. Shame on you. Either you are more clueless than Marvin the Martian about Life on Earth, in the* Terrestrial Sphere, *or you are not the friends of these innocent babies trying to have some dreams of doing some mathematics, the pride and joy of their moms and dads, who finally made it to Stanford Mathematics, and you want to just destroy their confidence and cause permanent trauma and turn them into self-doubting nervous wrecks ok? Why would you do that to these innocent little babes?*

39. Explication Of The Source Of The Problem

I will mitigate my harsh words here with the goal of elucidating the problem here. The problem is actually very well explained by Steven Pinker in his book on writing style. He observed that most bad writing in academia arise from the assumption that other people know what you know, and in an effort to be respectful of the reader's intelligence you write in a jargon-filled manner with assumptions peculiar to your field. And then it's bad writing because you don't communicate something that the reader can appreciate at all. This is the substance of the problem here. Most likely Laurent Schwartz particular books on distribution theory were mastered by a group of people who assumed all graduate students would know the material. But someone like me who had never looked at Laurent Schwartz textbook only picked up distribution theory elements from Reed-Simon and other places. I had never heard of any impossibility of multiplication in distributions. I knew that convolution operations had something valuable in distributions in a vague and nebulous manner. Of course I realised that Problem II.4 was technically challenging, but then when I found out that Laurent Schwartz thought it was worthy of research articles in 1954 and Hörmander was going on and on and on about all manner of issues in his book, I immediately realised that something was wrong here. It's far too hard for a Ph.D. Qualifying Level. These are questions that are well-known only to experts in partial differential equations *and even in fields a bit further away like optimal control or Harmonic Analysis I bet people consider these issues too esoteric and technical.*

I am most pleased despite having no idea how to do this because I feel that I have learned something about what is what in life on Earth after all.

Fine, I will examine these issues later. This is not a problem I will wish to attempt without further education in distribution theory.

40. Problem II.1

Suppose $T \subset \mathbf{R}$ is dense. Define translation maps $\tau_t : \mathbf{R} \to \mathbf{R}$ by

$$\tau_t(x) = x + t$$

Suppose $A \subset \mathbf{R}$ is Borel. Let m be the Lebesgue measure on Borel sigma-algebra of $\mathbf{R}$. The problem is to prove that if

$$m(\tau_t(A) - A) = 0$$

for all $t \in T$ then either A or $\mathbf{R} - A$ has Lebesgue measure zero.

40.1. **Preliminary Commentary.** *The moment I see this problem my immediate intuition is that this is one of these Baire Category Theorem problems. In order to test this intuition, let us assume that T is countable and dense. And let us examine the specific situation that A is nowhere dense.*

Then write $T = \{t_j\}_{j \in \mathbf{N}}$ and consider the sets

$$B_j = \tau_{t_j}(A) - A$$

The hypotheses of the problem tells us that $m(B_j) = 0$ for all $j \in \mathbf{N}$. Countable additivity of Lebesgue measure gives us

$$m(\bigcap_j B_j) = 0$$

Baire Category Theorem tells us that the grand union $B = \bigcup_j B_j$ has no interior and we also have $m(A) = 0$.

So the dividing line is whether A has interior or not. If A has any interior at all, then

$$\bigcup_j \tau_{t_j}(A) = \mathbf{R}$$

and then it is the hypotheses of the theorem that tells us that

$$\bigcup_j \tau_{t_j}(A) - A = \mathbf{R} - A$$

has Lebesgue measure zero.

So that's the way to do this. If A has no interior, then $m(A) = 0$ and if it does, then $m(\mathbf{R} - A) = 0$.

41. Problem II.2

(a) We are given u is a linear functional on $C^1(\mathbf{T})$ with the property that if $\varphi \geq 0$ then $u(\varphi) \geq 0$. We have to prove that there is a Borel measure μ so that

$$u(\varphi) = \int \varphi d\mu$$

(b) Suppose $A \in L(H)$ on a Hilbert space. Define $U(t) = f_t(A)$ where $f_t(s) = e^{its}$. Prove $U(t) - I$ is compact for all t if and only if A is compact.

41.1. **Riesz Representation Theorem.** *Well $C^1(\mathbf{T})$ with the norm*

$$\|f\|_{C^1} = \|f\|_\infty + \|f'\|_\infty$$

gets a completion $W^{1,\infty}(\mathbf{T})$ which is a Banach space. We consider the issue in $W^{1,\infty}(\mathbf{T})$ and apply the Riesz Representation theorem.

41.2. **Power Series Of Compact Operators.** *Start with A compact then A^k is compact so*

$$\sum_{j=1}^{\infty} (it)^k A^k / k!$$

is compact and so $U(t) - I$ is compact.

For the converse, we have

$$(U(t) - I)/it$$

is compact for all $t > 0$ and take a limit $t \to 0$. The limit is compact and is A.

42. Problem II.3

Let me translate the problem because there is a serious error in it.

We define operators

$$T_s f(x) = (1 + |x|^2)^{-s/2} f(x)$$

for $s > 1$ and then ask for the continuity of the map

$$T : (1, \infty) \to L(L^2(\mathbf{R}))$$

given by $T(s) = T_s$ in various topologies of $L(L^2(\mathbf{R}))$.

The problem has huge problems because instead of exponent $-s/2$ they put $is/2$ and then we don't have boundedness at all; the map is specified as $T : \mathbf{R} \to L(L^2(\mathbf{R}))$. This is also bad. It should have been $(1, \infty)$.

I had to read the mind of the examiners to figure out what was being meant.

So what we do is take difference and apply Cauchy-Schwarz and we'll get norm, strong, weak continuity.

43. Ruminations On Some Basic Mathematical Issues

As you are aware, I have been a strong advocate of a fundamental theoretical physics with (a) absolute space, (b) absolute time, (c) compact homogeneous four-sphere geometry for absolute space. I have been repeatedly promoting that all of macroscopic science is perfectly captured in the simple riemannian manifold

$$S^4 \times \mathbf{R}$$

with every part of the mathematics in this space being exactly in correspondence to the external objective Nature.

Here I claim that time in the usual ordering, metric, measure, topology is exact time. I take a strong position therefore against Albert Einstein and the entire ideology of Special Relativity. I do not believe that any part of Special Relativity is true at all.

I also take a strong position against redshift as any sort of evidence for expansion. I deny that there was any Big Bang. I strongly challenge Friedmann-Lemaitre-Walkers and others in extant established Cosmology and do not believe that there is any merit to their expansion theories.

I have put in more than a decades' worth of work into this and I have a great deal of numerical measurment matching to justify my position, and believe I have produced compelling successes.

I want to tell you that from the first inkling of these researches from around 2007 and more seriously from early to mid 2008 were completely my original work, and I did not follow anyone else's footsteps. The sacrifices that ensued, working in isolation without nontrivial income, without support of university or government, living in Allen Texas with family instead of having respectable income were part of the price I paid for my convictions, but I have been vindicated completely. I have not only established Nature's exact geometry but also established the final theory of Nature's Laws.

Much of the confidence came from my faith in Mathematics, at least the parts that I used, as having reliable ability to exactly replicate Nature. This confidence comes in the end in examining history of Mathematics in the long scale between 1660-2022 and examining what had managed to survive scrutiny and what had not, and how the natural philosophy transformed into a scientific ethos. It would have been impossible to do this by being tied to a specialisation in Science.

Although originally it was the geometry that drove my convictions, it became apparent that Analysis must have a central role once the geometry is clear.

All aspects of macroscopic Science must necessarily, eventually, fall within the bounds of four-sphere theory, which is a 'theory of everything' above $\delta = 10^{-15}$ cm scale.

There will be many more finer tests of four-sphere theory in the future, and I am confident that it will prove itself stronger with these tests. But this is an opportunity, before the theory is strongly entrenched, to take history and philosophy seriously and organise the development so that it can serve all sub-specialties of science in the best possible way, and find the merge of Mathematics and Science in

a perfect harmony. This is a good and wise idea now because it is quite likely that for the next ten thousand years, this will be the fundamental physics for all of the human race and so it is worthwhile examining the foundations and the deductive capabilities now before it becomes the object of contempt of every schoolchild on Earth for centuries.

44. Problem II.5

Recall that $SL_2(\mathbf{R}) \subset GL_2(\mathbf{R})$ *are matrices with determinant zero. The problem is to find all* Baire *measures on* $\mathbf{R}^2$ *invariant under this* $SL_2(\mathbf{R})$ *action.*

First of all, I hate all this jargonny things. Thankfully, the problem tells us that Baire *measures are Borel measures that are finite on compact sets. I appreciate that Rene-Louis Baire does need to be honoured for important contributions to real analysis, and I see that he was in delicate health just like me. But of course, the United States Government officials are more concerned about rubbish like psychiatric drug intake than actual threat to my life which are power maneuvers of Bill Gates using US War Power, US Industrial Power, White Racial Power, European Black Magic Power forbidden from thirteenth century and others with an explicit goal of murdering me.*

But this is good. So Baire measures are Borel measures with the additional constraint that they have to be finite on compact sets.

Now let's take a look at what we have. You see if the issue were just translation invariance we have the Lebesgue measure on $\mathbf{R}^2$ *and we have uniqueness.*

Now I don't know the answer to this question, so I will explore the issue a bit. The first question is existence of any Baire measure with the requisite property of invariance at all.

Let's begin simply and return to multivariable calculus. Suppose we take any region $\Omega \subset \mathbf{R}^2$*, and we have some smooth integrable function* f *on* Ω*. Then we let*

$$I = \int_\Omega f(x,y)dxdy$$

We want to consider the change of variable formula for this integral under a linear transformation $A \in SL_2(\mathbf{R})$*. These transformations will change variable to*

$$\begin{pmatrix} u \\ v \end{pmatrix} = A \begin{pmatrix} x \\ y \end{pmatrix}$$

The volume form will change by determinant of the Jacobian factor. And that's just 1 here.

So we have existence now because the Lebesgue measure satisfies the condition of the problem.

Now consider the problem among measures that are absolutely continuous with respect to Lebesgue measure. We have a theorem that tells us that Baire measures $\mu = \mu_a + \mu_b$ *where* μ_a *is absolutely continuous, and* μ_b *is singular with respect to Lebesgue measure.*

Then we use Radon-Nikodym theorem and get a density for μ_a*. We eliminate* μ_b *by noting that if even a single point is charged,* $SL_2(\mathbf{R})$ *invariance will charge infinitely many points in every compact region, and the measure won't be Baire anymore and so* $\mu_b = 0$*. Then we note that unless the density* $f(x,y)$ *is constant, it won't be* $SL_2(\mathbf{R})$ *invariant which leads to constant times Lebesgue measures are the only answer.*

45. FBI Discovered In Meta That Bill Gates Used Power To Steal My Money

FBI consider just found that Bill Gates literally stole my money in various ways. This is very very important. Bill Gates is not anything he pretends to be at all. He is not an intellectual genius or luminary. He is a thief and a liar and a robber and a hard-core racial supremacist and murderer and criminal. He is only these things and nothing else at all. He does not have great genius in coding or software engineering at all. He is just a thief, robber, murderer, criminal, and a charlatan.

I don't understand why people do not just pay a lot of attention to elementary things. He talks a lot about 'white white' but 99.9% of whites like 99.9% of human beings generally are strongly against stealing, robbing, harming people, and murdering and are concerned about being good decent people. Bill Gates did not change to this state. He is a born criminal, and he is only criminal, and a thorough review with care from 1955 will find, I am 1000% confident, that he was never any different. He is a psychopathic criminal with a gift for deceiving and manipulating gullible white Americans that he is a great genius with honest gifts.

This is trivial.

So that is Bill Gates 'secret to success'. He was a thief and robber and murderer and he stole money literally from various people and sought power and so he is really totally die-hard hard-core criminal who just practiced his craft of stealing, robbing and killing and deceiving all his life and that is the secret. He produced menial third rate products with his companies. His intellectual talents are mediocre. He had 1290 in SAT and lied to the world and said it was 1590. He did not impress me with his intellect. He is a power-monger however.

Now United States of America put the entire American population in grave danger by not slaughtering the son of a bitch late 1960s or early 1970s and instead aiding and abetting and harbouring the criminal. I was extremely badly hurt by him, but my Character is stellar.

Let me go over my VIA-120 statistics.

¿ xtable(virt)

First, we note that in my ranking, Humility is last, and Teamwork as well. The top three are Love, Creativity and Honesty. This is a very serious ranking. I spent a lot of time being extremely self-reflective and answering Martin Seligman's questionnaire. I respect his work tremendously and plan to work on Quantitative Positive Psychology when I get tenure from Stanford or elsewhere.

People like Bill Gates whose character are not good but who have something to lose, like an empire of $131 billion, should not be assaulting me because my Character is simple and honest, and I do not give a damn about being honest about anything to anyone and don't feel embarrassed about talking about my own private sexuality or anything else. I am an open sort of cat and do not have any chip on my shoulder for failure to be wealthy now at 49. I am an immortal genius and my success is in scales of millenia. I do not consider this a failure in life for not having some money.

Anyway, it's all over for Bill Gates. He should not have messed with Zulf. Zulf is superior in Character, in Intellect, in coding and Mathematical and Scientific talents, in cultivation in Literature and Poetry, in taste, and other things. Bill Gates is superior in extreme evil, tribal murderous racist power ideology, stealing,

	Rank	*Virtue*	*Class*
1	*1*	*Love*	*(Humanity)*
2	*2*	*Creativity*	*(Wisdom)*
3	*3*	*Honesty*	*(Courage)*
4	*4*	*Curiosity*	*(Wisdom)*
5	*5*	*Spirituality*	*(Transcendence)*
6	*6*	*Hope*	*(Transcendence)*
7	*7*	*Bravery*	*(Courage)*
8	*8*	*Humor*	*(Transcendence)*
9	*9*	*Forgiveness*	*(Temperance)*
10	*10*	*Perspective*	*(Wisdom)*
11	*11*	*LoveOfLearning*	*(Wisdom)*
12	*12*	*AppreciationOfBeautyAndExcellence*	*(Transcendence)*
13	*13*	*SocialIntelligence*	*(Humanity)*
14	*14*	*Zest*	*(Courage)*
15	*15*	*Gratitude*	*(Transcendence)*
16	*16*	*Self-Regulation*	*(Transcendence)*
17	*17*	*Fairness*	*(Justice)*
18	*18*	*Perserverence*	*(Courage)*
19	*19*	*Judgment*	*(Wisdom)*
20	*20*	*Leadership*	*(Justice)*
21	*21*	*Kindness*	*(Humanity)*
22	*22*	*Prudence*	*(Temperance)*
23	*23*	*Teamwork*	*(Justice)*
24	*24*	*Humility*	*(Temperance)*

lying and murders, etc. How can he win? I deserve higher Social Status in American Society than Bill Gates obviously.

References

[1] `https://drive.google.com/file/d/10fqKTQuXqs77vP7Ahm08iqdp0EA_uygX/view?usp=sharing`
[2] `https://www.youtube.com/watch?v=tIcxjxZ7vH4`
[3] `https://github.com/zulf73/S4TheoryNotes`
[4] Laurent Schwartz, Sur le impossibilité de la multiplication des distributions. Séance, 847–849