ISSN: 2834-7706
Review Article
Journal of Mathematical Techniques and Computational Mathematics

Hadamard Matrix Conjecture

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Submitted: 03 Jan 2023; **Accepted:** 13 Jan 2023; **Published:** 07 Feb 2023

Citation: Cusack, P. T. E. (2023). Hadamard Matrix Conjecture. *J Math Techniques Comput Math*, 2(2), 86-88.

Abstract
The Hadamard Matrix Conjecture has been an open problem for decades. In this paper, we attempt to solve the problem of the existence of Hadamard Matrices. The solution is that the rank of a square matric must be divisible by 4. We use AT Math to solve this problem.

Keywords: Hadamard Matrix Conjecutrue.

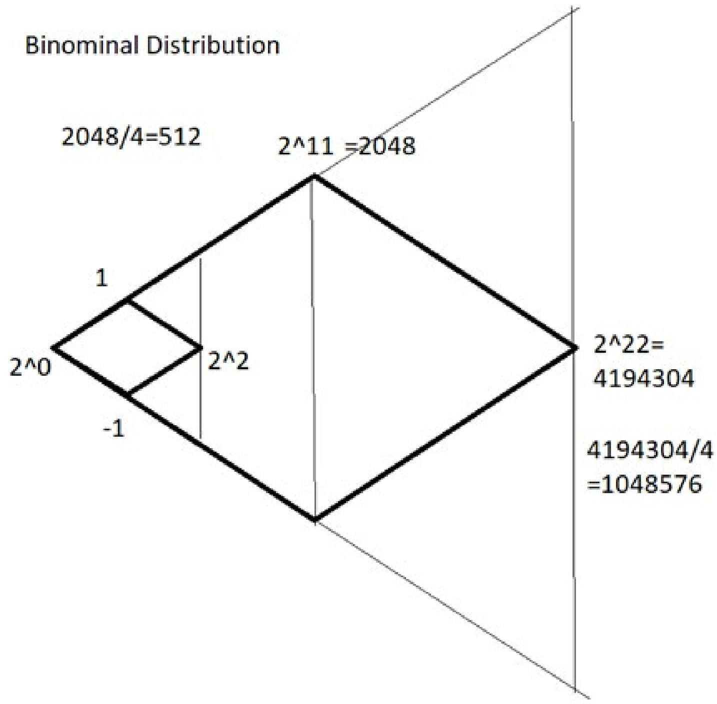

Figure 1: The Binominal Distribution

Introduction

In this paper, we solve the existence of Hadamard Matrices.

H_1= [1]
$H_2 \stackrel{def}{=} 1/\sqrt{2}$[11]=[sin 45° cos 45°]
[1 -1] [cos 45° -sin 45°]
|D|=-$\sin^2$ 45°-$\cos^2$45° ⇒Euler's Trigonometric Identity
= -1/2-1/2
=-1
Hn=[|1 1|, |1 1|....]=2n-2, n≥4
| |1 -1|, |1 -1| |
[...]

This is the binominal distribution the largest matrix necessary to encompass the entire universe is 2^{22}.
$2^{22}/4$
$=2^{22}/2^2$
Binominals n≥4, are always divisible by 2^2
û= [1, 2, 4]
v̂= [1, 5 ,11]
û ·v̂=|u||v| cos θ
1+5+11=17
2+10+22=34
4+20+44=68
$...2^n$

$|u||v| \cos\theta=2^n\cos\theta=0$ for $\hat{u}\perp\hat{v}$
$2^n\neq 0$
$n\text{Ln } 2\neq 0$
$\cos\theta=0$
$\theta=90° \Rightarrow \hat{u}\perp\hat{v}$
$(\sqrt{2})^n=2^{n/2}$
$\text{Ln } 2^{n/2}=n/2 \text{ Ln } 2$
$=n(-0.693)/2$
$=-n(M/t)$
$=-2n$
$=\int\sin\theta-\int\cos\theta$ from $1\to\pi/4$
$=[\cos 1-\cos(\pi/4)]-[\sin 1-\sin(\pi/4)]$
$=[0.5403-0.7071]-[0.84147-0.7071]$
$=-0.1668-0.13437$
$=0.30117$
$-2n=0.30117$
$n=-0.150585$
$=1/-6.641\approx 1/-G=1/E=t$
$n=t$

$t^2-t-1=E=1$
$t=2, -1$
$t^2-t-1=\mathbb{Z}$
$\mathbb{Z}'=2t-1$
$\mathbb{Z}''=2$
$M=\text{Ln } t$
$t=e^M=\mathbb{Z}=\mathbb{Z}'=\mathbb{Z}''=2$
$\text{Ln } e^M=\text{Ln } 2$
$M=\text{Ln } 2$
$M=\text{Ln } t$
$t=2$

$2^2-2-1=1=E$
$n=t=2$
$(\sqrt{2})^n=2^{n/2}$
$\text{Ln } 2^{n/2}=n/2 \text{ Ln } 2$
$\text{Ln } 2=\text{Ln } 2$
True!
$t^2-t-1=E=1/t$
$3t^2/2-2t-1=1$
$3t^2-4t-2=2$
$t^2-4/3t-4/3=0$
$t=2,1/3$
$t=1/E=1/3$ $E=3$
$t^2-t-1=3$
$t^2-t-4=0$
$t=[-1\pm\sqrt{17}]/2\neq\mathbb{Z}$
So $\mathbb{Z}=1$ when $t=2$
$t\equiv[1\pm\mathbb{Z}]/2$ where $\mathbb{Z}=\sqrt{[b^2-4ac]}$

Let $t=2$
$2=[1\pm\mathbb{Z}]/2$
$4=[1\pm\mathbb{Z}]$
$\pm\mathbb{Z}=3=t$
$\mathbb{Z}=\pm 3$

Let $t=3$
$3=[1\pm\mathbb{Z}]/2$
$6=[1\pm\mathbb{Z}]$
$\mathbb{Z}=\pm 5$

Let $t=4$
$4(2)=[1\pm\mathbb{Z}]$
$\mathbb{Z}=\pm 7$

Let $t=5$
$5(2)=[1\pm\mathbb{Z}]$
$\mathbb{Z}=\pm 9$

$\mathbb{Z}=\pm\{3,5,7,9....\}$
where $\mathbb{Z}=\sqrt{[b^2-4ac]}$

For $-4/3=s$
$\mathbb{Z}=8/3=SF$

Aside
$SF=F=1/E$
$t=1/E$

$[s\pm SF]/t=\mathbb{Z}$
$=v\pm SF/t=\mathbb{Z}$
$=1/\sqrt{2}\pm t=\mathbb{Z}$
$\mathbb{Z}=1/\sqrt{2}\pm t=\mathbb{Z}'=\mathbb{Z}''=e^M$

$1/\sqrt{2}=e^M$
$\text{Ln }(1/\sqrt{2})=M=\text{Ln } t$
$t=1/\sqrt{2}=\sin 45°=\cos 45°$

$t=\sin t=\cos t$
$y=y'=t$

$E=dE/dt$

$t^2-t-1=2t-1$

$t=3;\ E=5$

$t=\sin\theta=\cos\theta$
$\sin^2\theta+\cos^2\theta=1^2$ Euler
$\sin^2\theta=1-\cos^2\theta$
$1=1/\sin^2\theta-\cot^2\theta$
$E=E^2-\cot^2\theta$
$E^2-E-\cot^2\theta=0$

Let $\cot^2\theta=1$
$\theta=45°$

$E^2-E-1=0$
$x^2-x-1=0 \Rightarrow$ GMP

$E=t$
$E^2-E-1=0$
$\mathbb{Z}=\sqrt{[b^2-4ac]}$

$=\sqrt{[(-1)^2-4(1)(-1)]}$

$=\sqrt{[1+4]}$
$=\sqrt{5} \neq$Integer
=hypotenuse of the GM Triangle with legs 1 & 2

$\mathbb{Z}^2= (\sqrt{5})^2=5=$Integer$=E \Rightarrow t=3\ y=y'$

$\mathbb{Z}=\mathbb{Z}'=\mathbb{Z}''=e^M=5$
M=Ln 5=Ln t
t=5
t=1,2,3,5=n
$(\sqrt{2})^n=2^{n/2}$
$(\sqrt{2})^n=2^{n=/2}$

$\sqrt{2}=E_{max}=\sin 45°+\cos 45°=1/\sqrt{2}+1/\sqrt{2}=2/\sqrt{2}=\sqrt{2}$
t=2;
$2.828=\bar{P}=Mv=4(1/\sqrt{2}) \neq$Integer
$2^2=4=M$
$2^{5/2}=2^{2.5}=5.6568\neq$Integer

The integers are t=1,2,4.
E^2-E-cot θ=0
For the 1-2-√5 triangle:
$E=-(-1) \pm\sqrt{[(-1)^2-4(1)(-2/1)]}/2$
$= [1\pm\sqrt{9}]/2$
=2; -1

For the 3-4-5 triangle:
$E= (-1) \pm\sqrt{[(-1)^2-4(1)(-3/4)]}/2$
$= (-1) \pm\sqrt{[1+3]}/2$
$= (-1) \pm 1$
=0; -2

E^2-E-cot θ=0
Pythagoras
$a^2+b^2=c^2=\mathbb{Z}=\pm\sqrt{[b^2-4ac]}$
$\mathbb{Z}^2=\pm[b^2-4ac]$
$\mathbb{Z}^2=\pm [(-1)^2-4(1)(\cot \theta)]$
$\mathbb{Z}^2=\pm [1-4\cot \theta]$
$\mathbb{Z}=\pm\sqrt{[1-4a/b)]}$
$\mathbb{Z}^2=1-4a/b$
$\mathbb{Z}\times\mathbb{Z}=\mathbb{Z}$
$\mathbb{Z}=1-4a/b$
$\mathbb{Z}-1=\mathbb{Z}=-4a/b$
$\mathbb{Z}/4=-a/b=-\cot \theta$
$\mathbb{Z}/4=\mathbb{Z}=-\cot \theta$
$\mathbb{Z}=-\cos \theta/\sin\theta$
$y=y' =-\sin \theta=\cos \theta$
$\mathbb{Z}=1$
$\theta=45°=\pi/4$

$\mathbb{Z}= \{\mathbb{Z}^2, \mathbb{Z}-1, \mathbb{Z}/4\}$
$\mathbb{Z}/4 \Rightarrow\mathbb{Z}\geq 4=n$
$2^{n/2}=2^2=4$

The Hadamard must be divisible by 1,2,4,8,16,32 or 1,2,4\

There are no Hadamard Matrices for: 668, 716, 892, 1132, 1244, 1388, 1436, 1676, 1772, 1916, 1948, and 1964 because they are not divisible consecutively by 4.

$\mathbb{Z}=\mathbb{Z}^2=\mathbb{Z}-1=\mathbb{Z}/4$

$\sqrt{\mathbb{Z}}=\sqrt{[\mathbb{Z}-1]} =\sqrt{[\mathbb{Z}/4]}$
$\mathbb{Z}-1=\mathbb{Z}/4$
$4(\mathbb{Z}-1) =\mathbb{Z}$
$4\mathbb{Z}-\mathbb{Z}=1$
$3\mathbb{Z}=1$
$\mathbb{Z}=1/3=1/t=E$
$E=\mathbb{Z}$
$t^2-t-1=E=\mathbb{Z}$
$\mathbb{Z}'=\mathbb{Z}''=2$
$t^2-t-1=2$
$t^2-t-3=0$
$t^2-t-t=0$
$t^2-2t=0$
$t(t-2) =0$
t=0; t=2
QED

Conclusion
Hadamard Matrices must be divisible by 4.

References
Wikipedia.