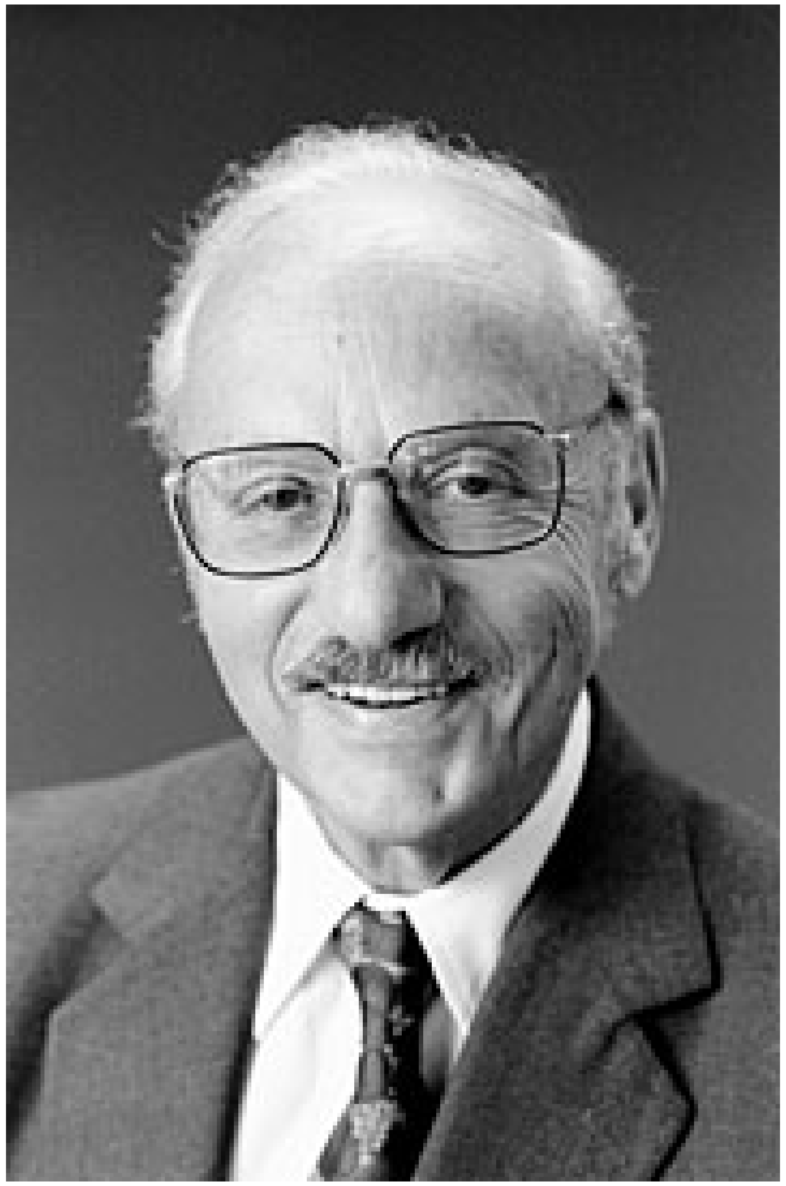
The Harms of Historical Hyperbole

Dylan Spicker, PhD Candidate (Presented on June 30th 2021)



Who was George Dantzig?

An American Mathematician/Statistician who created the simplex algorithm for linear programming.

Operations Researchers: "Oh no. We can't check 70! combinations. That will take longer than the heat death of the universe. Aweh shucks."

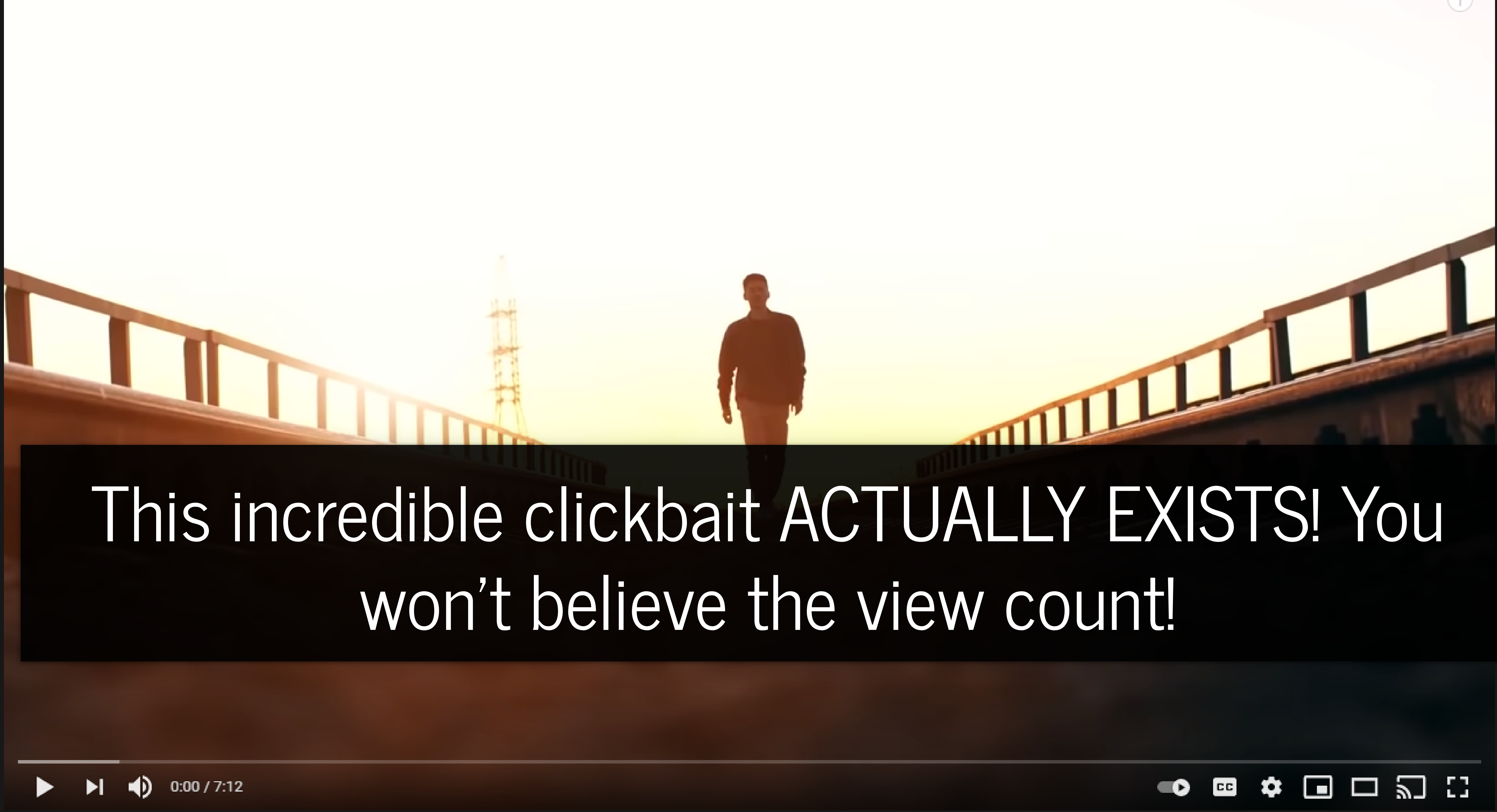
The Simplex Algorithm ENTER STAGE RIGHT

The Simplex Algorithm: "I can do that, fast and effectively! Even on computers from the 1940s!"

Operations Researchers: "Yay! Now we can solve all of these allocation problems effectively."

Good ~~George Dantzig~~ Will Hunting

Some liberties were taken...



A slacker was 20 minutes late and received two math problems... His solutions shocked his professor.

5,423,535 views • Sep 9, 2020

100K 3.5K SHARE SAVE

Life Stories
415K subscribers

SUBSCRIBE

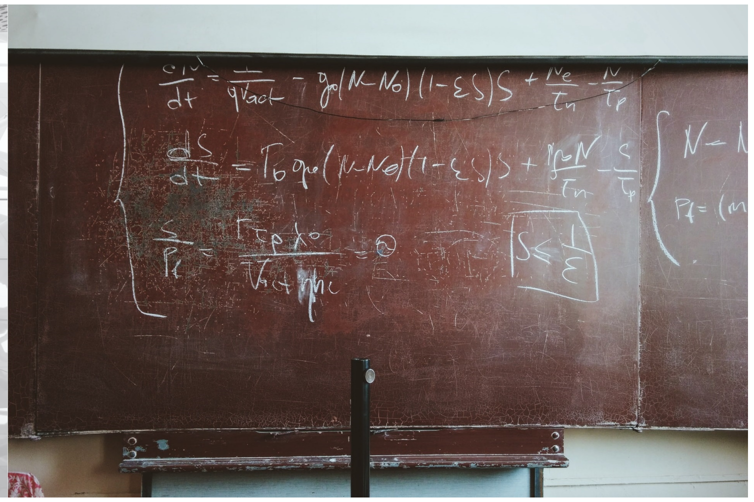
Today I will tell you a relatively short story about a young man, which occurred many years ago. Even though the story contains nothing supernatural, I’m not exaggerating when I say that it was able to change the lives of millions across the world. In one way or another, every self-

SHOW MORE

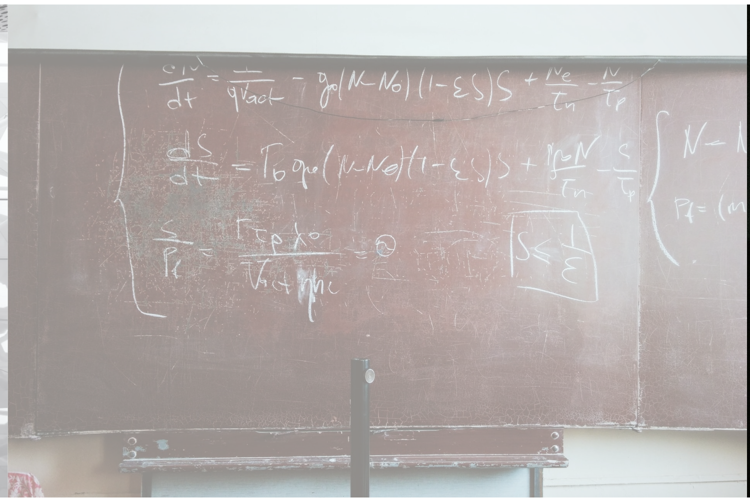
The Unsolved Homework Problems

The Unsolved Homework Problems

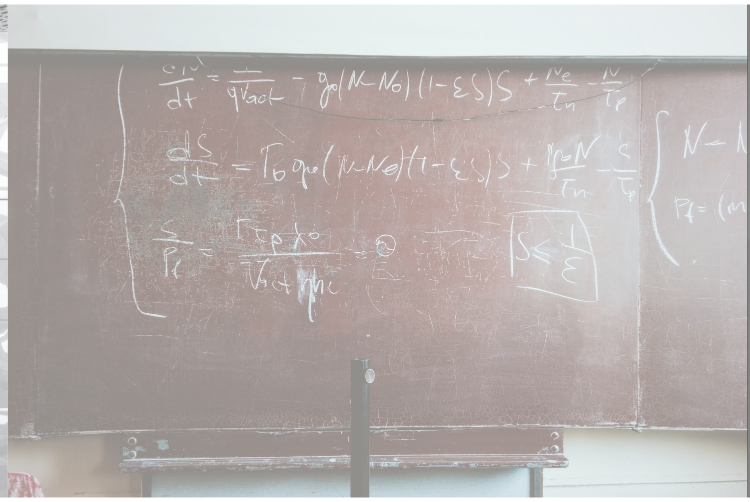
The Unsolved Homework Problems



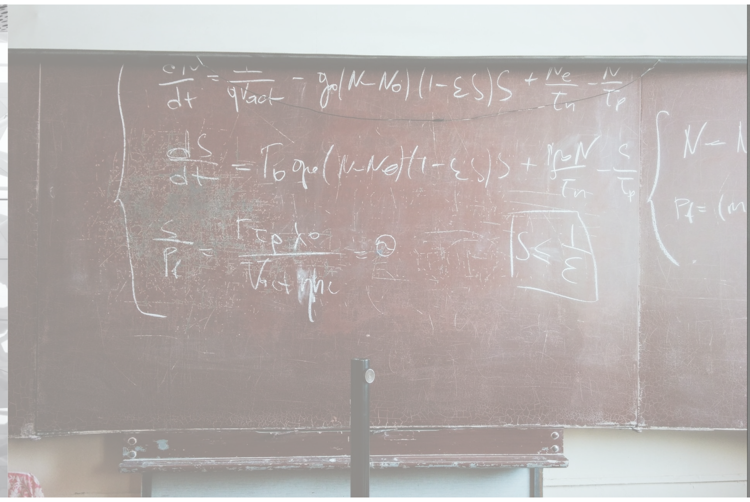
The Unsolved Homework Problems



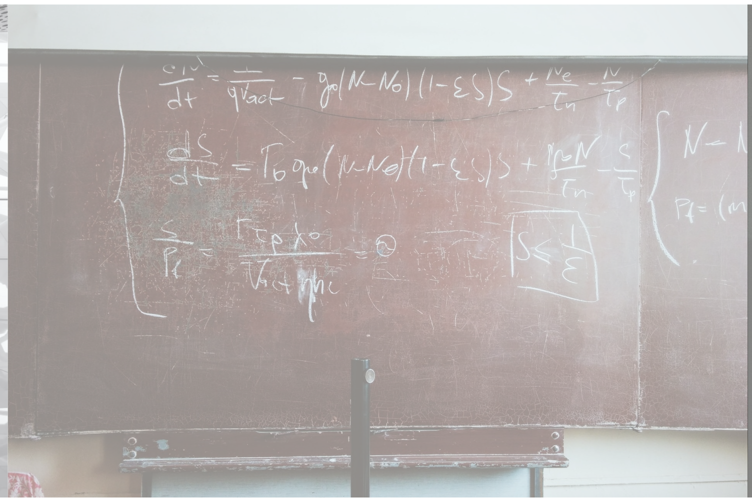
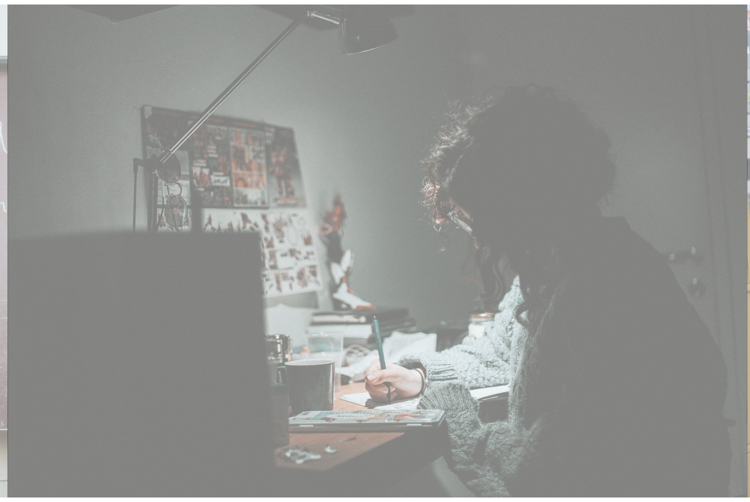
The Unsolved Homework Problems



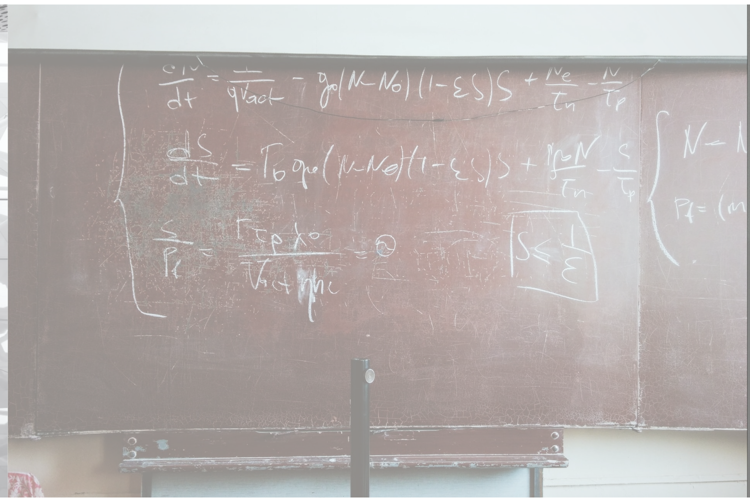
The Unsolved Homework Problems

The Unsolved Homework Problems



The Unsolved Homework Problems

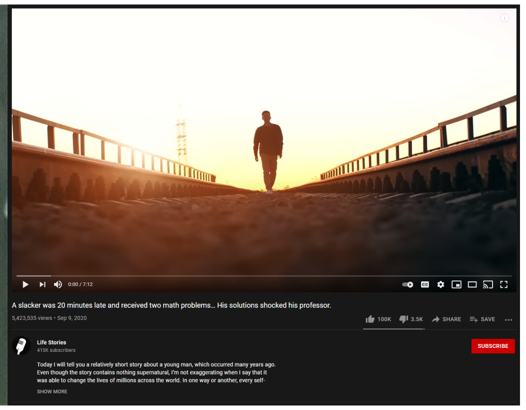



What lessons are learned from this?

What lessons are learned from this?

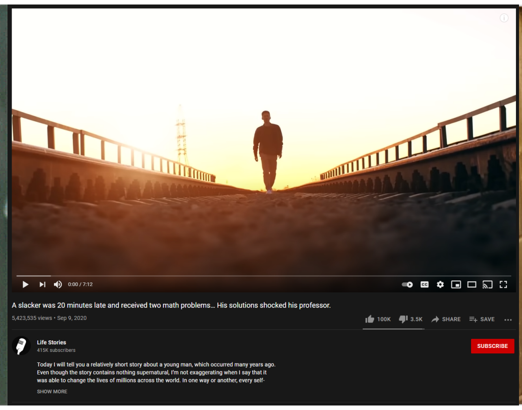
1. George Dantzig was a genius.

What lessons are learned from this?



1. George Dantzig was a genius.
2. Positive thinking makes you into a genius.

What lessons are learned from this?



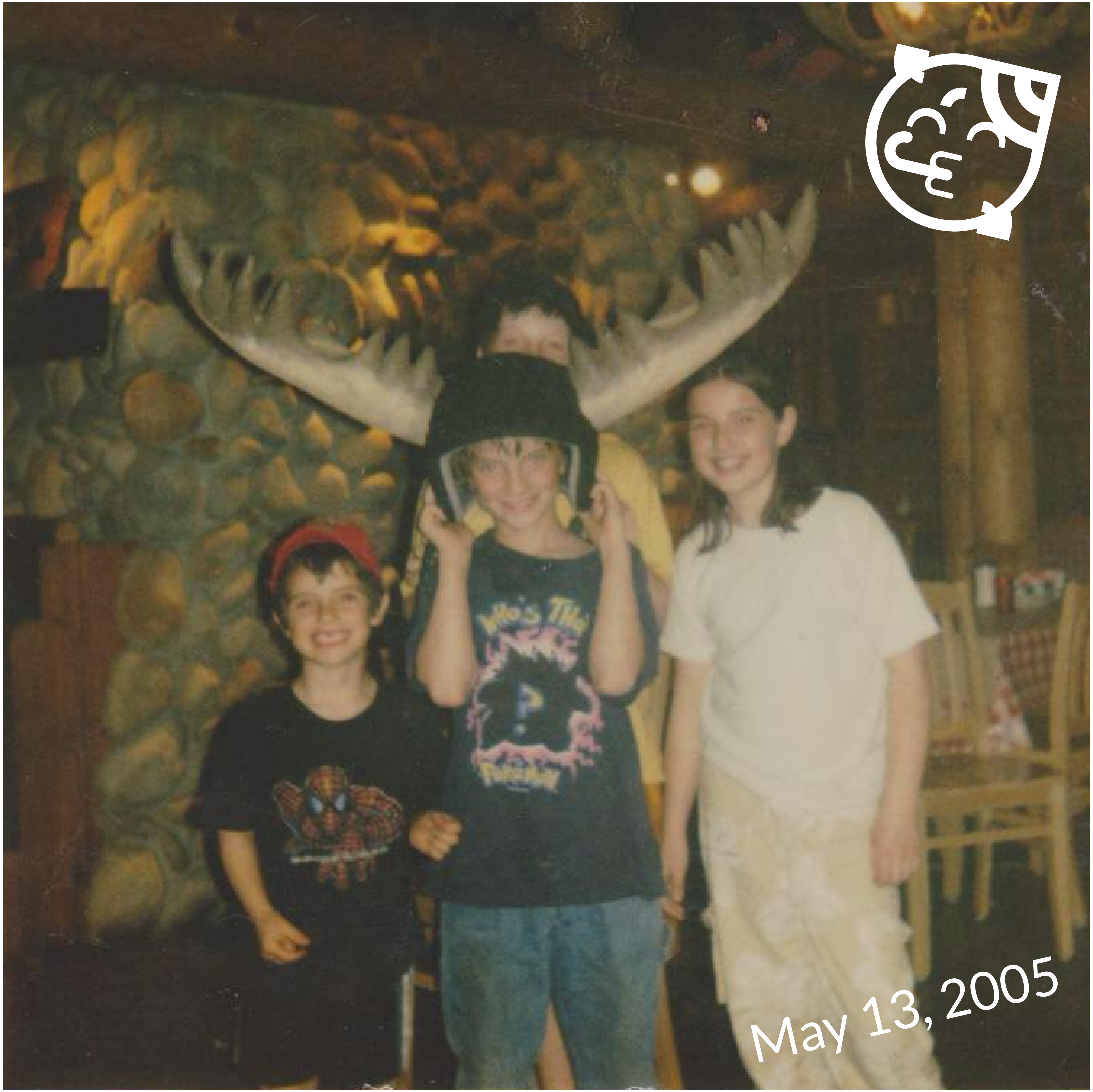
1. George Dantzig was a genius.
2. Positive thinking makes you into a genius.
3. Geniuses finish their disserations in a week.

Therein lies my beef.

Those lessons are lies*.

* or at least not justified by the storied event.

the cake is a lie.


May 13, 2005

The Washington Post
Democracy Dies in Darkness

Vanguard Mathematician George Dantzig Dies

By **Joe Holley**
May 19, 2005

George B. Dantzig, 90, a mathematician who devised a formula that revolutionized planning, scheduling, network design and other complex functions integral to modern-day business, industry and government, died May 13 at his home in Palo Alto, Calif. The cause of death, according to his daughter, was complications from diabetes and cardiovascular disease.

Dr. Dantzig was known as the father of linear programming and as the inventor of the "simplex method," an algorithm for solving linear programming problems.

"He really created the field," said Irvin Lustig, an operations research software consultant who was Dr. Dantzig's student at Stanford University.

Dr. Dantzig's seminal work allows the airline industry, for example, to schedule crews and make fleet assignments. It's the tool that shipping companies use to determine how many planes they need and where their delivery trucks should be deployed. The oil industry long has used linear programming in refinery planning, as it determines how much of its raw product should become different grades of gasoline and how much should be used for petroleum-based byproducts. It's used in manufacturing, revenue management, telecommunications, advertising, architecture, circuit design and countless other areas.

"The virtually simultaneous development of linear programming and computers led to an explosion of applications, especially in the industrial sector," Stanford University Professor Arthur F. Veinott Jr. said in a statement. "For the first time in history, managers were given a powerful and practical method of formulating and comparing extremely large numbers of interdependent alternative courses of action to find one that was optimal."

May 13, 2005

Look at all the famous people.

Plot Twist

I used to kind of love Dantzig.

We need to make sure we always take care of ourselves. It is important to do what is right for us, always, regardless of any extrinsic forces. You matter.

Please, if you ever need to chat, email me or reach out.

dylan.spicker@uwaterloo.ca

We need to do a better job at recognizing the impact of the environments that we create have on others. My talk is tongue-in-cheek and meant to be entertaining, but that is simply a tool at cutting through our inability to discuss these issues frankly. I promise I will get back to less serious slides next, but please take this to heart. If it is helpful, remember that other people feel like you do and want to be there to support you.

So What is My Take?

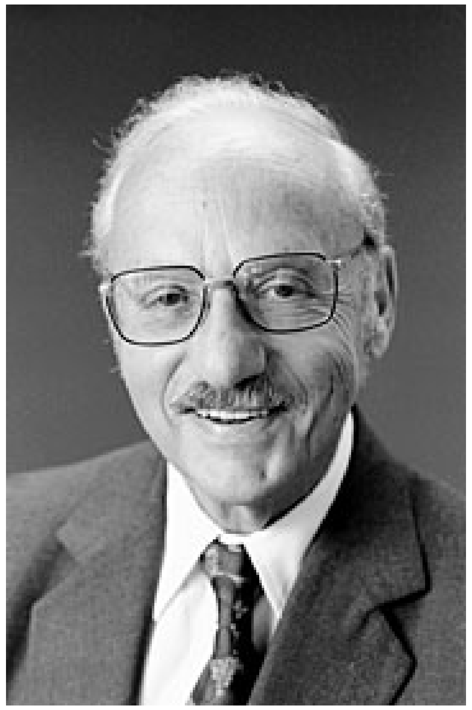
George Dantzig did what most graduate students do…

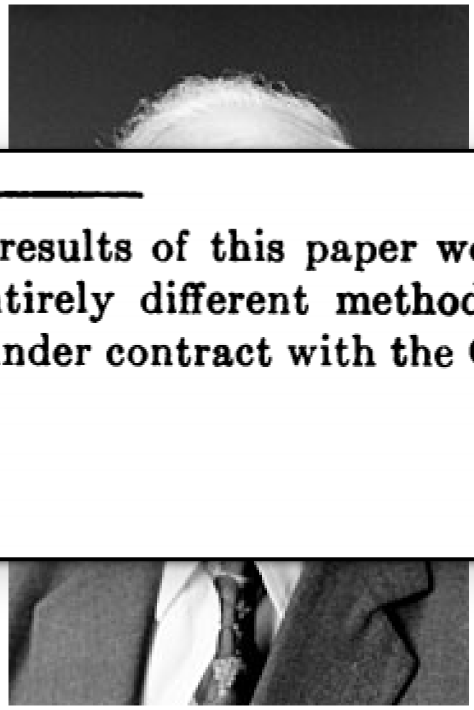
… and that is something we should celebrate.

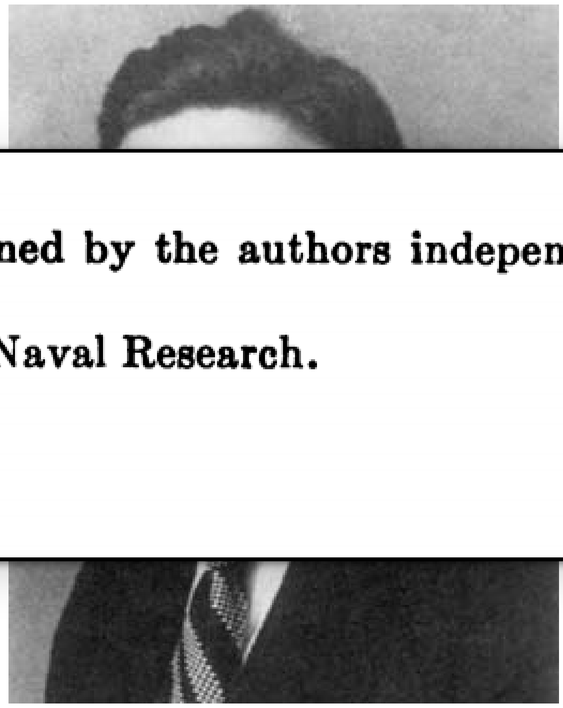
Myth #1

These were very famous problems…


One
Eternity
Later



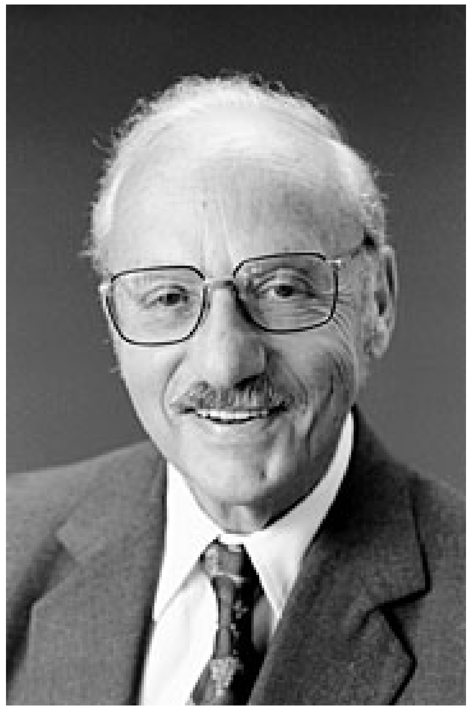




[1] The main results of this paper were obtained by the authors independently of each other using entirely different methods.

[2] Research under contract with the Office of Naval Research.

How about we co-author this one?



ON THE FUNDAMENTAL LEMMA OF NEYMAN AND PEARSON[1]

BY GEORGE B. DANTZIG AND ABRAHAM WALD[2]

Department of the Air Force and Columbia University

1. Summary and introduction. The following lemma proved by Neyman and Pearson [1] is basic in the theory of testing statistical hypotheses:

LEMMA. *Let $f_1(x), \cdots, f_{m+1}(x)$ be $m + 1$ Borel measurable functions defined over a finite dimensional Euclidean space R such that $\int_R |f_i(x)| \, dx < \infty$ $(i = 1, \cdots, m + 1)$. Let, furthermore, $c_1, \cdots, c_m$ be m given constants and $\mathcal{S}$ the class of all Borel measurable subsets S of R for which*

Matches: 7

Batch Download: Reviews (HTML) | Retrieve Marked | Retrieve First 50 | Mark All | Unmark All

Publications results for "Citations of 39962"

Sort by: Newest

Search within results

Item Type
- Reviewed (4)
- Indexed (3)

Institutions
- University of Bucharest (3)
- Department of Applied Mathematics, Dalian University of Technology (2)
- Department of Mathematics, Aligarh (2)

Authors
- Cottle, Richard (3)

- **MR2346179** Reviewed Ahmad, Izhar; Sharma, Sarita Sufficiency in multiobjective subset programming involving generalized type-I functions. *J. Global Optim.* 39 (2007), no. 3, 473–481. 90C29 More links
  Review PDF | Clipboard | Journal | Article
- **MR2292141** Indexed Cottle, Richard; Johnson, Ellis; Wets, Roger George B. Dantzig (1914–2005). *Notices Amer. Math. Soc.* 54 (2007), no. 3, 344–362. 01A70 (90-03) More links
  Review PDF | Clipboard | Journal | Article | 4 Citations
- **MR2248450** Reviewed Liu, Sanming; Feng, Enmin The saddle theorem for multiobjective generalized fractional programming problems with set functions. *J. Appl. Math. Comput.* 22 (2006), no. 1-2, 181–191. (Reviewer: Margaret M. Wiecek) 90C29 (90C47) More links
  Review PDF | Clipboard | Journal | Article | 1 Citation
- **MR2185925** Indexed Cottle, Richard W. George B. Dantzig: a legendary life in mathematical programming. *Math. Program.* 105 (2006), no. 1, Ser. A, 1–8. 01A70 More links
  Review PDF | Clipboard | Journal | Article | 13 Citations
- **MR2193867** Indexed Cottle, Richard W. George B. Dantzig: operations research icon. *Oper. Res.* 53 (2005), no. 6, 892–898. 01A70 (90-03) More links
  Review PDF | Clipboard | Journal | Article | 10 Citations
- **MR1994176** Reviewed Preda, Vasile; Stancu-Minasian, I. M.; Koller, Eduard On optimality and duality for multiobjective programming problems involving generalized d-type-I and related n-set functions. *J. Math. Anal. Appl.* 283 (2003), no. 1, 114–128. (Reviewer: Xin Min Yang) 90C29 (90C46) More links
  Review PDF | Clipboard | Journal | Article | 2 Citations
- **MR1970576** Reviewed Preda, Vasile; Bătătorescu, Anton On duality for minmax generalized B-vex

ON THE NON-EXISTENCE OF TESTS OF "STUDENT'S" HYPOTHESIS HAVING POWER FUNCTIONS INDEPENDENT OF σ

BY GEORGE B. DANTZIG

1. Introduction. Consider a system of n random variables $x_1, x_2, \cdots, x_n$ where each is known to be normally distributed about the same but unknown mean, ξ, and with the same, but also unknown standard deviation σ. The assumption, H_0, that ξ has some specified value, ξ_0, e.g. $\xi_0 = 0$, while nothing is assumed about σ, is known as the "Student" Hypothesis. Two aspects of the hypothesis H_0 have been already studied extensively. If the alternatives with respect to which it is desired to test H_0 assume specifically that $\xi > \xi_0$, (or $\xi < 0$), then we have the so-called asymmetric case of "Student's Hypothesis" and it is known, [1], that there exists a uniformly most powerful test of H_0. This consists in the rule, originally suggested by "Student," of rejecting H_0 whenever

Matches: 5

Batch Download: Reviews (HTML) | Retrieve Marked | Retrieve First 50 | Mark All | Unmark All

Publications results for "Citations of 2082"

Sort by: Newest

Search within results

Item Type
- Indexed (3)
- Reviewed (2)

Institutions
- Department of Mathematics, Stanford University (2)
- Department of Economics, Princeton University (1)

- **MR3476613** Reviewed Perchet, Vianney; Rigollet, Philippe; Chassang, Sylvain; Snowberg, Erik Batched bandit problems. *Ann. Statist.* 44 (2016), no. 2, 660–681. (Reviewer: Alwell Julius Oyet) 62L05 (62C20) More links
  Review PDF | Clipboard | Journal | Article | 1 Citation
- **MR2608463** Reviewed Aoshima, Makoto; Yata, Kazuyoshi Asymptotic second-order consistency for two-stage estimation methodologies and its applications. *Ann. Inst. Statist. Math.* 62 (2010), no. 3, 571–600. 62L12 (62F12 62F25 62J15) More links
  Review PDF | Clipboard | Journal | Article | 1 Citation
- **MR2292141** Indexed Cottle, Richard; Johnson, Ellis; Wets, Roger George B. Dantzig (1914–2005). *Notices Amer. Math. Soc.* 54 (2007), no. 3, 344–362. 01A70 (90-03) More links
  Review PDF | Clipboard | Journal | Article | 4 Citations
- **MR2185925** Indexed Cottle, Richard W. George B. Dantzig: a legendary life in mathematical programming. *Math. Program.* 105 (2006), no. 1, Ser. A, 1–8. 01A70 More links
  Review PDF | Clipboard | Journal | Article | 13 Citations
- **MR2193867** Indexed Cottle, Richard W. George B. Dantzig: operations research icon. *Oper. Res.* 53 (2005), no. 6, 892–898. 01A70 (90-03) More links

ON THE FUNDAMENTAL LEMMA OF NEYMAN AND PEARSON[1]

By George B. Dantzig and Abraham Wald[2]

Department of the Air Force and Columbia University

1. Summary and introduction. The follow

Pearson [1] is basic in the theory of testing

LEMMA. *Let* $f_1(x), \cdots, f_{m+1}(x)$ *be* $m +$

over a finite dimensional Euclidean space

$(i = 1, \cdots, m + 1)$. *Let, furthermore,* c_1,

the class of all Borel measurable subsets S *of*

ON THE NON-EXISTENCE OF TESTS OF "STUDENT'S" HYPOTHESIS HAVING POWER FUNCTIONS INDEPENDENT OF σ

By George B. Dantzig

1. Introduction. Consider a system of n random variables $x_1, x_2, \cdots, x_n$

y distributed about the same but unknown

also unknown standard deviation σ. The

ecified value, ξ_0, e.g. $\xi_0 = 0$, while nothing

he "Student" Hypothesis. Two aspects of

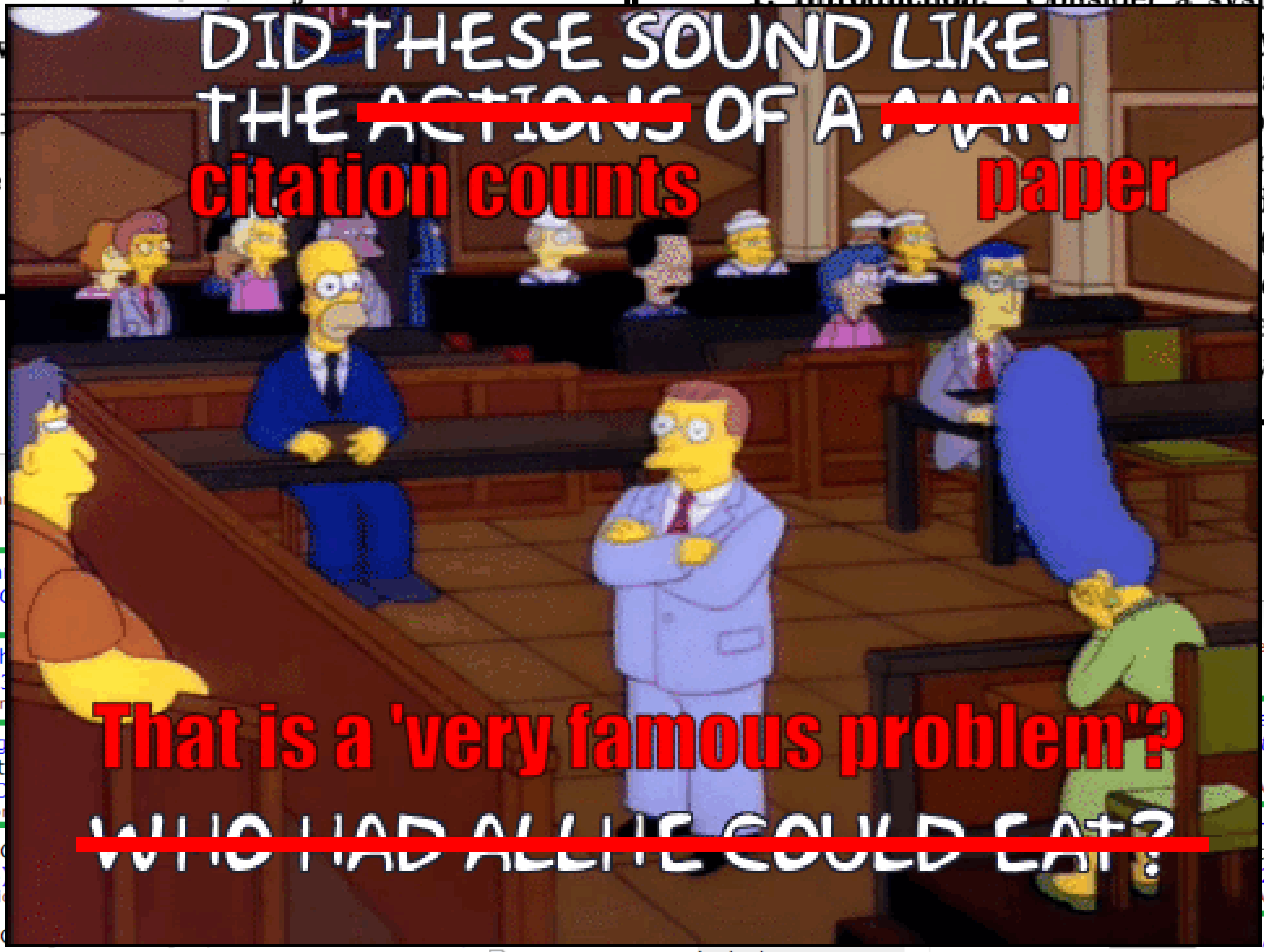
ly studied extensively. If the alternatives

to test H_0 assume specifically that $\xi > \xi_0$,

ed asymmetric case of "Student's Hypothe-

xists a uniformly most powerful test of H_0.

y suggested by "Student," of rejecting H_0



Matches: 7

Batch Download: Reviews (HTML) Retrieve Marked | Retrieve First 50 | Ma

Publications results for "Citations of 39962"

Sort by: Newest

Search within results

Item Type
- Reviewed (4)
- Indexed (3)

Institutions
- University of Bucharest (3)
- Department of Applied Mathematics, Dalian University of Technology (2)
- Department of Mathematics, (2)

Authors
- Cottle, Richard (3)

MR2346179 Reviewed Ahmad, Izhar; Sha
involving generalized type-I functions. *J.*
Review PDF | Clipboard | Journal | Article

MR2292141 Indexed Cottle, Richard; Joh
Notices Amer. Math. Soc. 54 (2007), no.
Review PDF | Clipboard | Journal | Article | 4 Citation

MR2248450 Reviewed Liu, Sanming; Feng
fractional programming problems with set
191. (Reviewer: Margaret M. Wiecek) 90C
Review PDF | Clipboard | Journal | Article | 1 Citation

MR2185925 Indexed Cottle, Richard W.
programming. *Math. Program.* 105 (2006)
Review PDF | Clipboard | Journal | Article | 13 Citati

MR2193867 Indexed Cottle, Richard W.
(2005), no. 6, 892–898. 01A70 (90-03) More links
Review PDF | Clipboard | Journal | Article | 10 Citations

MR1994176 Reviewed Preda, Vasile; Stancu-Minasian, I. M.; Koller, Eduard On optimality and duality for multiobjective programming problems involving generalized d-type-I and related n-set functions. *J. Math. Anal. Appl.* 283 (2003), no. 1, 114–128. (Reviewer: Xin Min Yang) 90C29 (90C46) More links
Review PDF | Clipboard | Journal | Article | 2 Citations

MR1970576 Reviewed Preda, Vasile; Bătătorescu, Anton On duality for minmax generalized B-vex

Home | Preferences | Free Tools | Help | Contact Us | Terms of Use | Blog

Univ of Waterloo

ve First 50 | Mark All | Unmark All

et, Vianney; Rigollet, Philippe; Chassang, Sylvain; Snowberg, Erik Batched
t. 44 (2016), no. 2, 660–681. (Reviewer: Alwell Julius Oyet) 62L05 More links
rticle | 1 Citation

ma, Makoto; Yata, Kazuyoshi Asymptotic second-order consistency for
dologies and its applications. *Ann. Inst. Statist. Math.* 62 (2010), no. 3,
25 62J15) More links
rticle | 1 Citation

Institutions
- Department of Mathematics, Stanford University (2)
- Department of Economics, Princeton University (1)

, Richard; Johnson, Ellis; Wets, Roger George B. Dantzig (1914–2005).
Notices Amer. Math. Soc. 54 (2007), no. 3, 344–362. 01A70 (90-03) More links
Review PDF | Clipboard | Journal | Article | 4 Citations

MR2185925 Indexed Cottle, Richard W. George B. Dantzig: a legendary life in mathematical programming. *Math. Program.* 105 (2006), no. 1, Ser. A, 1–8. 01A70 More links
Review PDF | Clipboard | Journal | Article | 13 Citations

MR2193867 Indexed Cottle, Richard W. George B. Dantzig: operations research icon. *Oper. Res.* 53 (2005), no. 6, 892–898. 01A70 (90-03) More links

Myth #2

These problems were unsolved…

r/stupidquestions

Posts

38

Posted by u/ThisQuestionReallyWasAskedButEditingNamesIsFun 1 year ago

Why are there things called unsolved mysteries? Shouldn't they be unsolved in the first place to be called a mystery?

3 Comments Award Share Save Hide Report 98% Upvoted

SORT BY **BEST**

A_Really_Smart_User_Who_Is_Not_Fake · 1y

TRUUUUUUUUE yo.

This is the exact same principle by saying that someone's novel research approached "unsolved" problems. Of course the problems that the novel research is solving are unsolved, otherwise they would not be unsolved problems any longer! It baffles the mind that so many people call Dantzig's homework 'unsolved' instead of just pointing out that Dantzig did some research -- something all graduate students do, mind you -- which itself implies that the questions that were being solved had not previously been solved (to anyone's knowledge).

9000+ Give Award Share Report Save

lved is a
ty useless
ctive
.

About Community

r/stupidquestions

Ask all your stupid and/or embarrassing questions here. Don't understand something that seemingly everyone else understands? Ask it here.

12.0k Members

58 Online

Created Apr 26, 2009

Join

Create Post

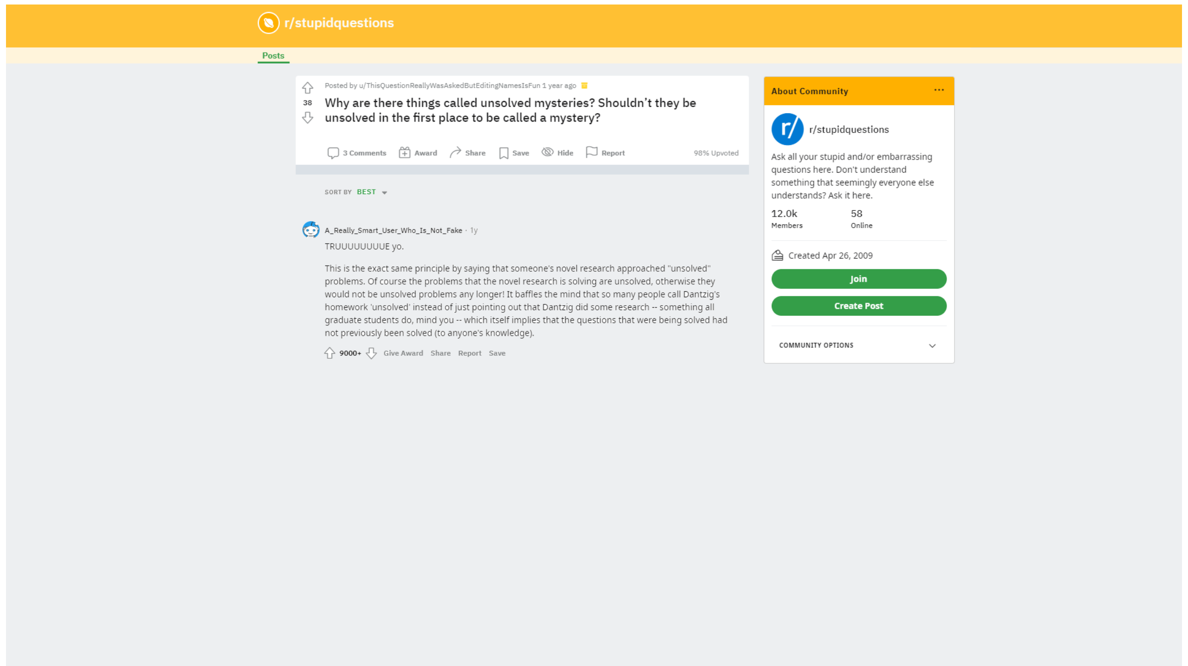
COMMUNITY OPTIONS

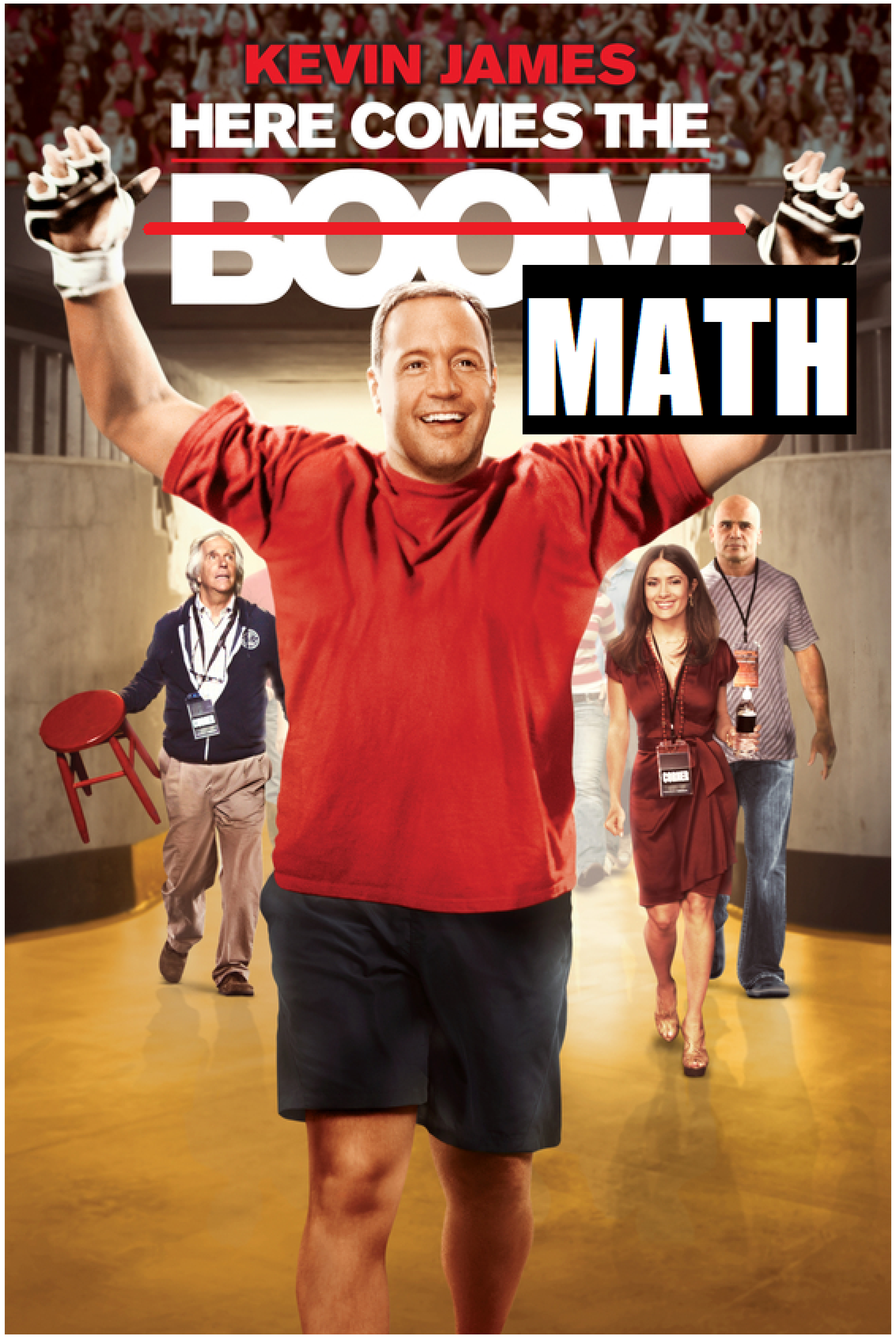
Myth #3

Many statisticians tried and failed to solve these...

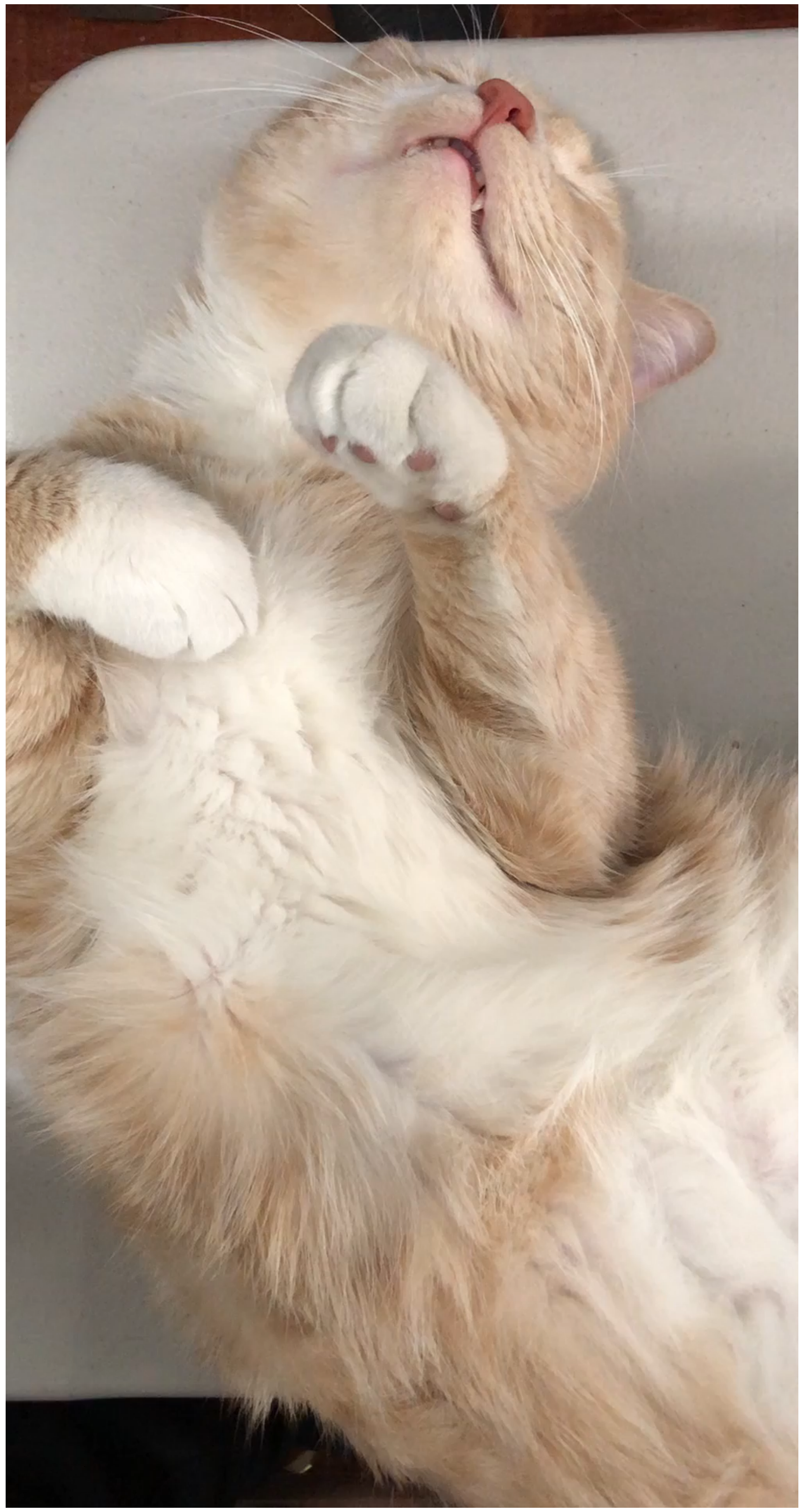

DID THESE SOUND LIKE
THE ~~ACTIONS~~ OF A ~~MAN~~
citation counts
paper
That is a 'very famous problem'?
~~WHO HAD ALL HE COULD EAT?~~


NO... WHY WOULD YOU ASK THAT?


r/stupidquestions
Posts
Posted by u/ThisQuestionReallyWasAskedButEditingNamesIsFun 1 year ago
38
Why are there things called unsolved mysteries? Shouldn't they be unsolved in the first place to be called a mystery?
3 Comments Award Share Save Hide Report
98% Upvoted
SORT BY BEST
A_Really_Smart_User_Who_Is_Not_Fake · 1y
TRUUUUUUUUE yo.
This is the exact same principle by saying that someone's novel research approached "unsolved" problems. Of course the problems that the novel research is solving are unsolved, otherwise they would not be unsolved problems any longer! It baffles the mind that so many people call Dantzig's homework 'unsolved' instead of just pointing out that Dantzig did some research -- something all graduate students do, mind you -- which itself implies that the questions that were being solved had not previously been solved (to anyone's knowledge).
9000+ Give Award Share Report Save
About Community
r/stupidquestions
Ask all your stupid and/or embarrassing questions here. Don't understand something that seemingly everyone else understands? Ask it here.
12.0k Members
58 Online
Created Apr 26, 2009
Join
Create Post
COMMUNITY OPTIONS


KEVIN JAMES
HERE COMES THE
~~BOOM~~
MATH


KEVIN JAMES
HERE COMES THE
WHAT'S THE DEAL
WITH ~~AIRPLANE~~
proofs in presentations?



Assume that $X_1, \ldots, X_n$ are all i.i.d. $N(\mu, \sigma^2)$.

We wish to test $H_0 : \mu = \mu_0$, versus the alternative,
$H_1 : \mu \neq \mu_0$.

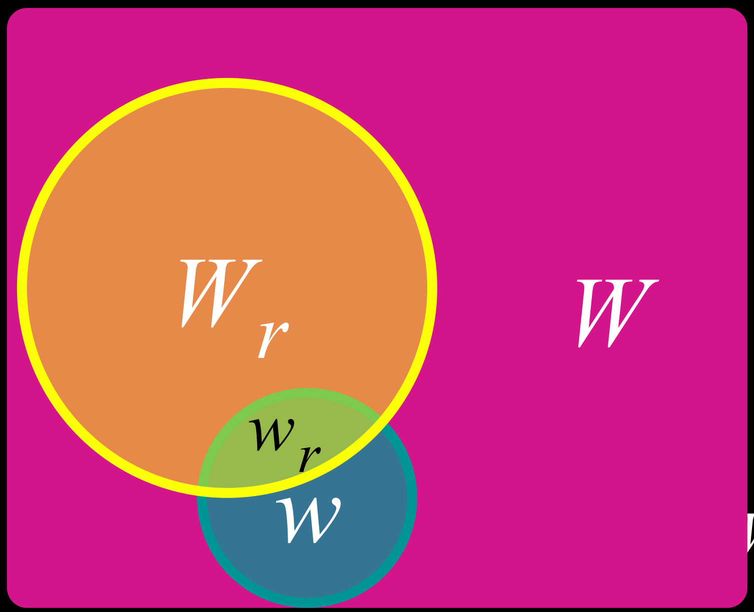
Recall that the statistical power of a test is:

$$\text{Power} = \beta(\mu, \sigma) = P(\text{Reject } H_0; \mu, \sigma)$$

Can you devise a test with power that is independent of σ?

Generalized Polar Coordinate Transformation:

We can transform R^n to a space with $(r, \theta_2, \theta_3, \ldots, \theta_n)$. The Jacobian of the transformation is given by $|\Delta_r| = r^{n-1}T(\theta)$.



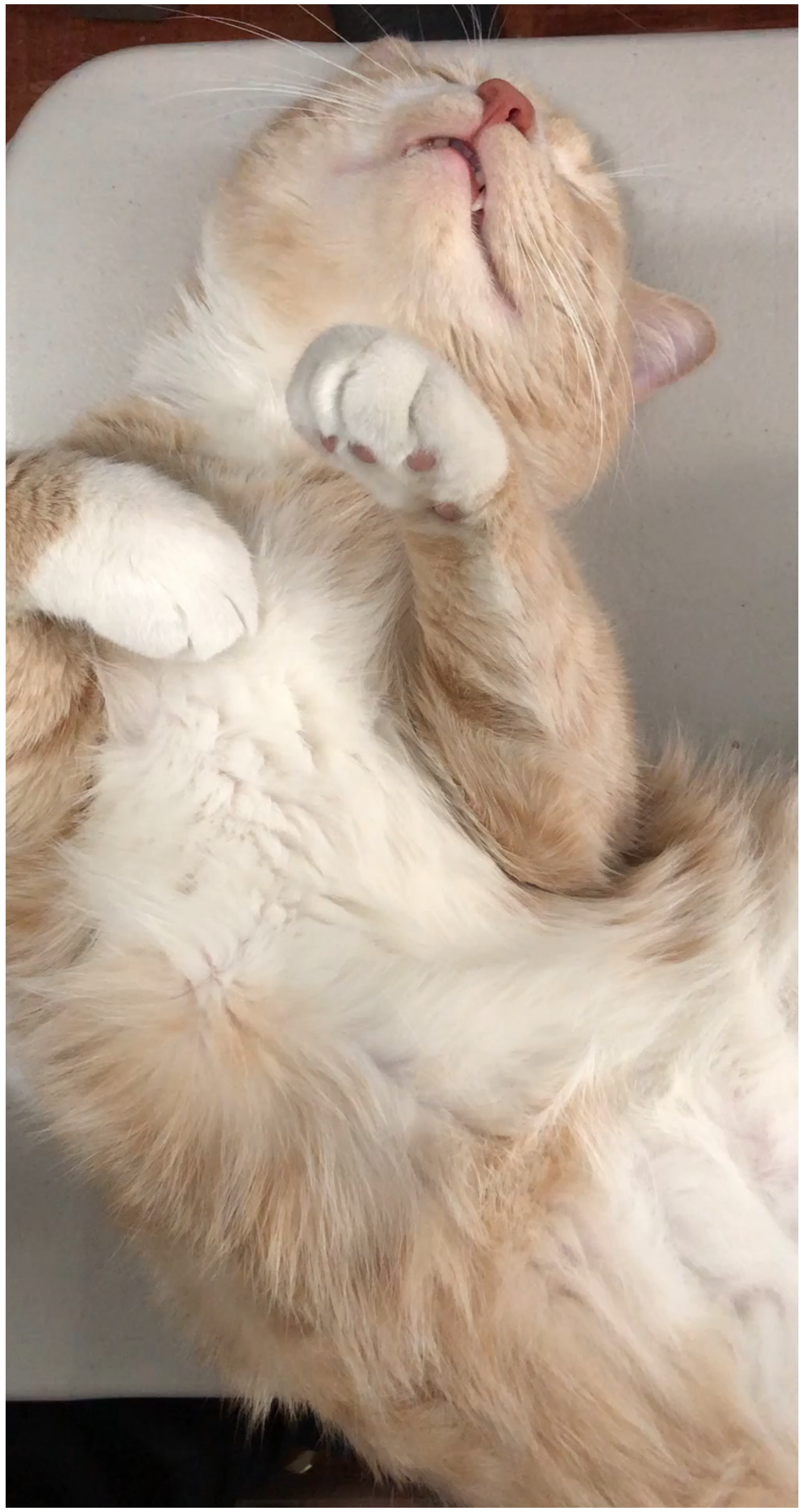
W is the sample space.

$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

w is the rejection region.

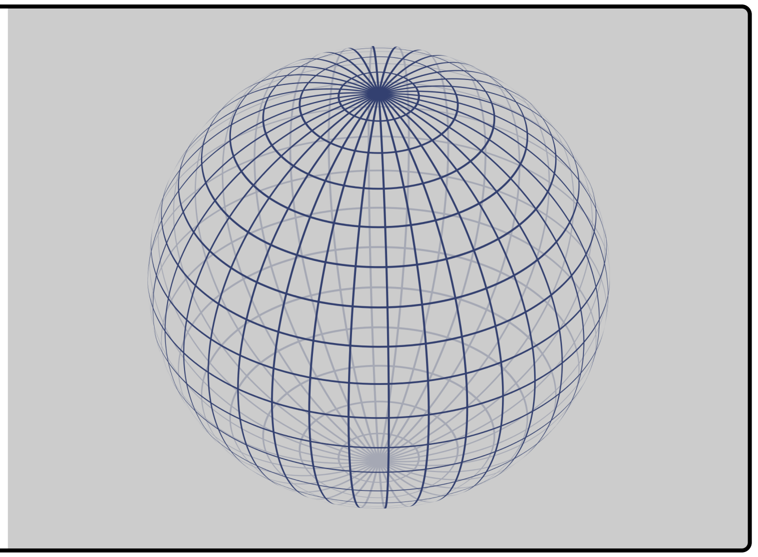
W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^{n}(x_i - \mu_0)^2 = r^2$).

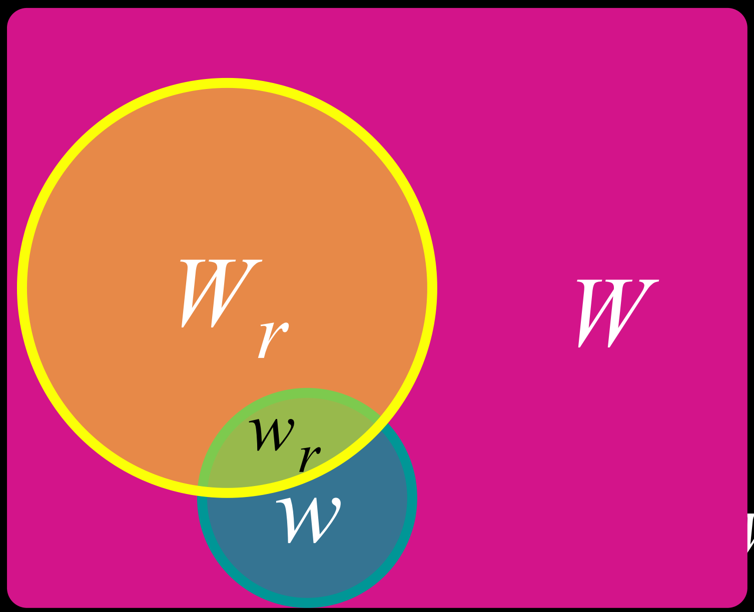
w_r is the intersection $W_r \cap w$.



Surface Area of a Hypersphere:

The surface area of W_r is given by $\int \cdots \int_{W_r} |\Delta| \, d\theta_1 \cdots d\theta_n = r^{n-1}K$, where K is functionally independent of r.





W is the sample space.

$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

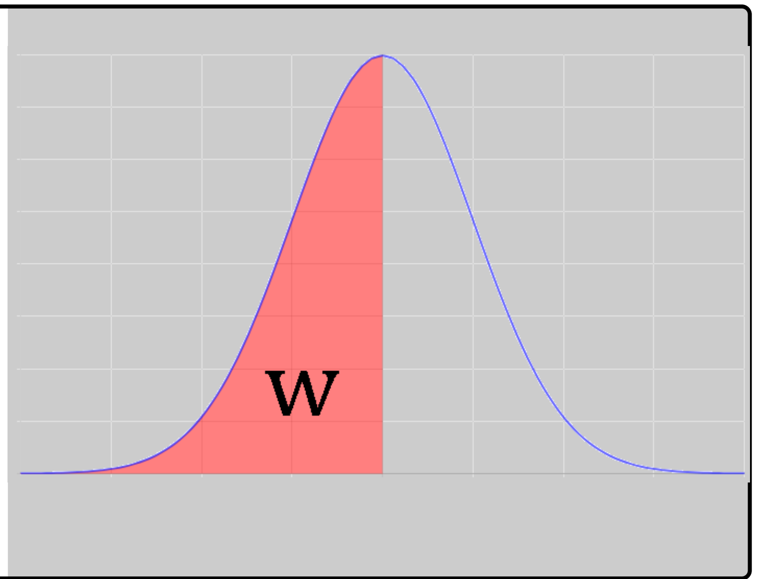
w is the rejection region.

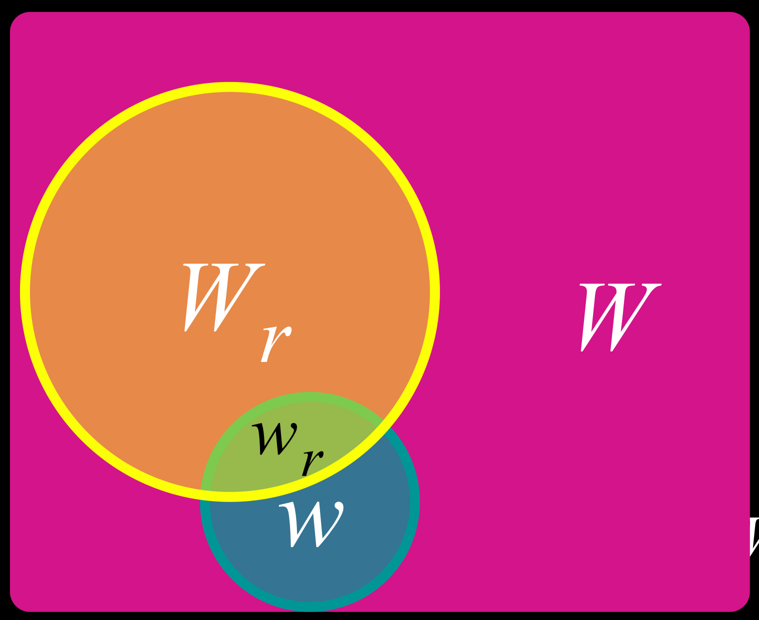
W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^{n} (x_i - \mu_0)^2 = r^2$).

w_r is the intersection $W_r \cap w$.

Similar Region:

Given a parametric family of distributions, parameterized by $\theta \in \Theta$, w is called similar to W **with size** $\boldsymbol{\alpha}$ if $P(\mathbf{x} \in w; \theta) = \alpha$ for all $\theta \in \Theta$.





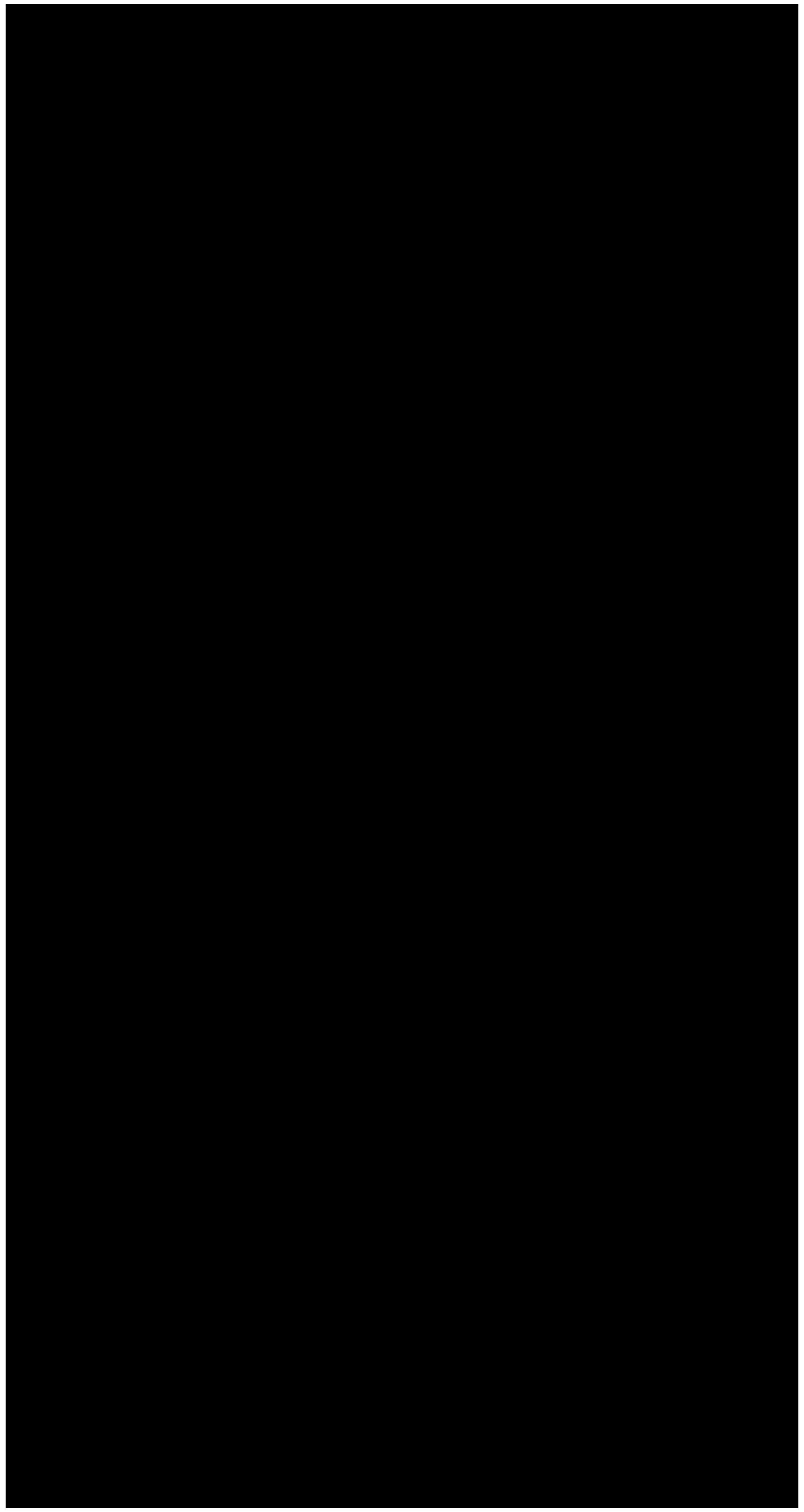
W is the sample space.

$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

w is the rejection region.

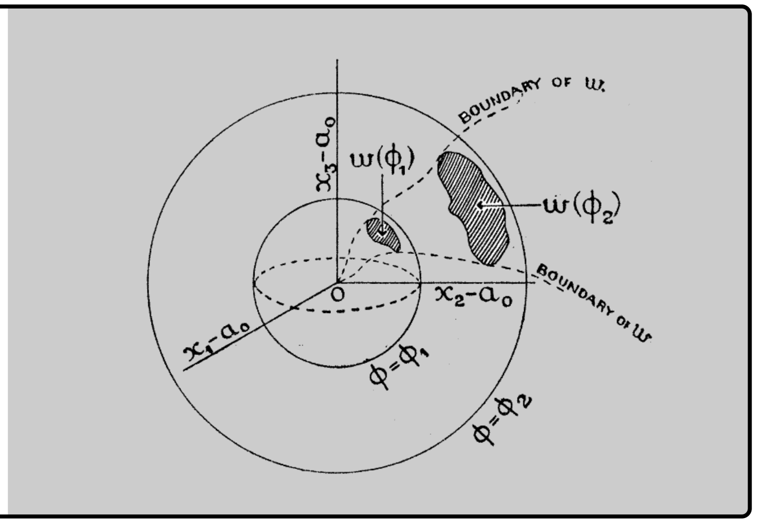
W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^{n}(x_i - \mu_0)^2 = r^2$).

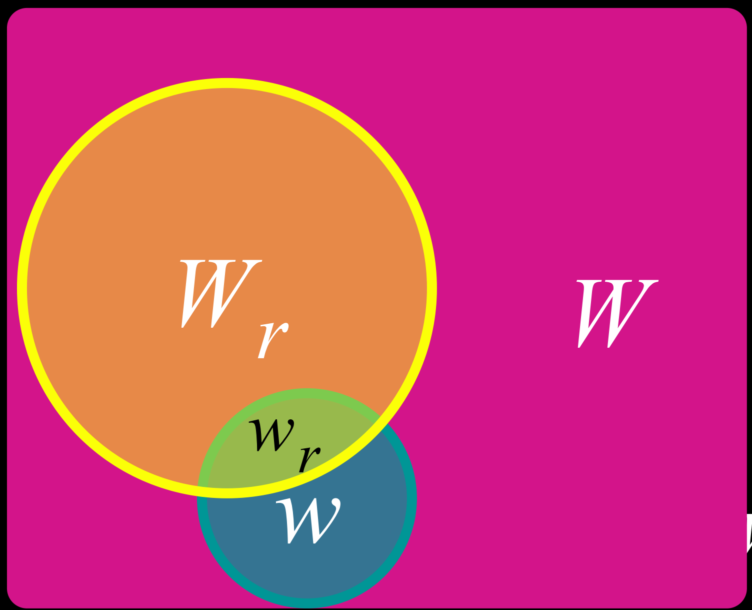
w_r is the intersection $W_r \cap w$.



Theorem 1 (Neyman-Pearson, 1933):

If $\mathbf{x}$ is normally distributed, then w is similar to W with size α if and only if, for all $r \geq 0$ we have $P(\mathbf{x} \in w_r \,|\, \mathbf{x} \in W_r) = \alpha$.





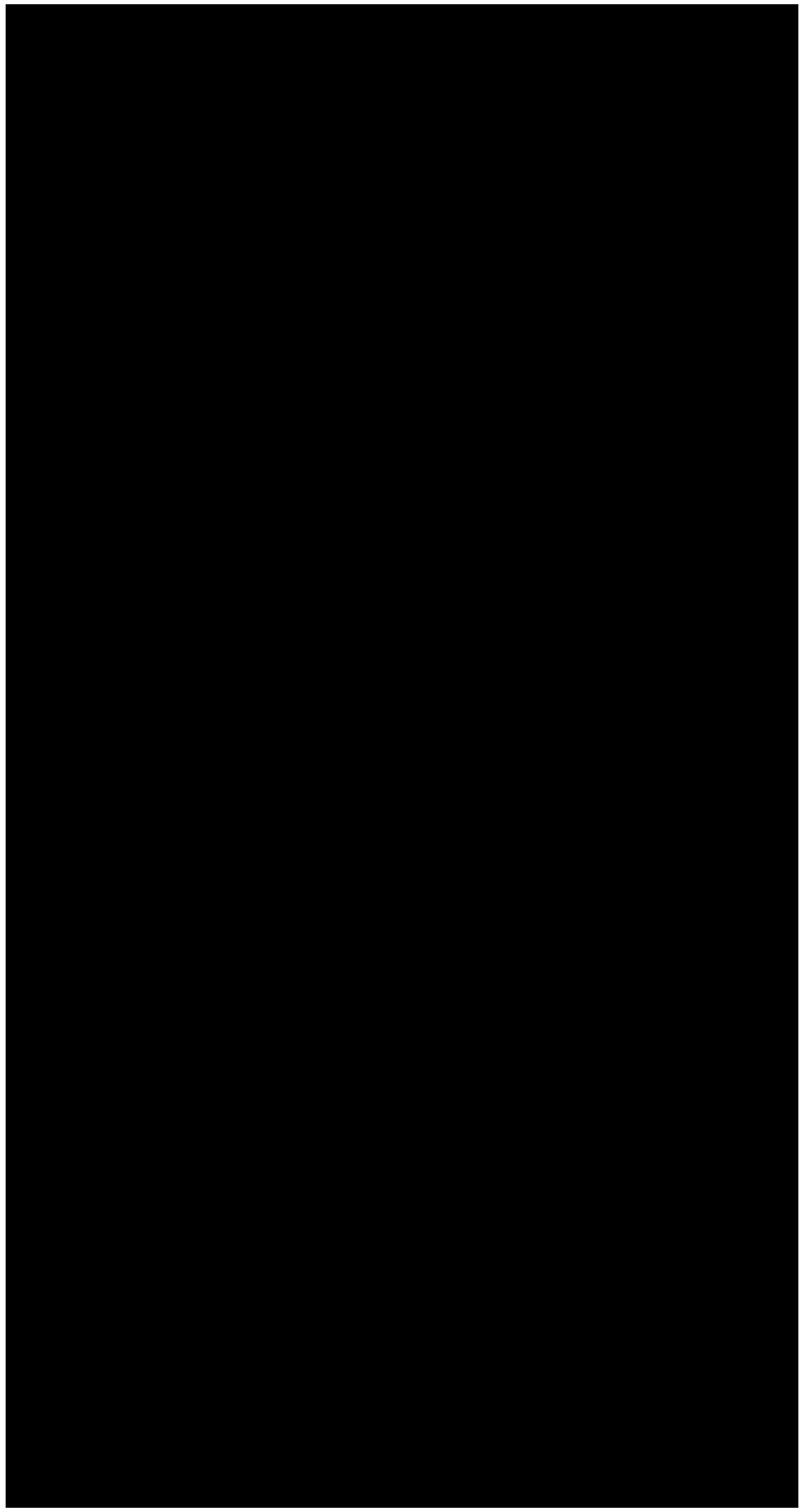
W is the sample space.

$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

w is the rejection region.

W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^{n}(x_i - \mu_0)^2 = r^2$).

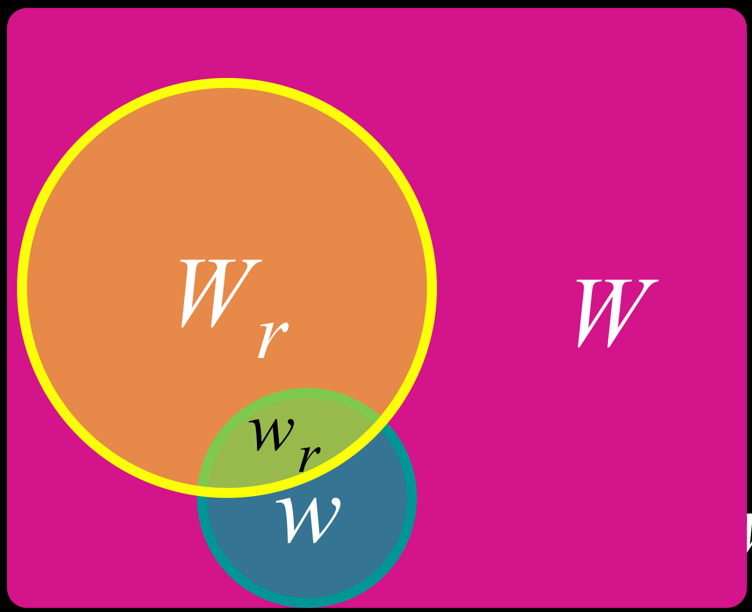
w_r is the intersection $W_r \cap w$.



Step 1 (Assume that the region exists):

Suppose w exists with $P(\mathbf{x} \in w; \mu_0) = \alpha$ and $P(\mathbf{x} \in w; \mu_1) = \beta$ for all σ.

That is, w is similar with size α similar with size β, to normal distributions parameterized by σ.



W is the sample space.

$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

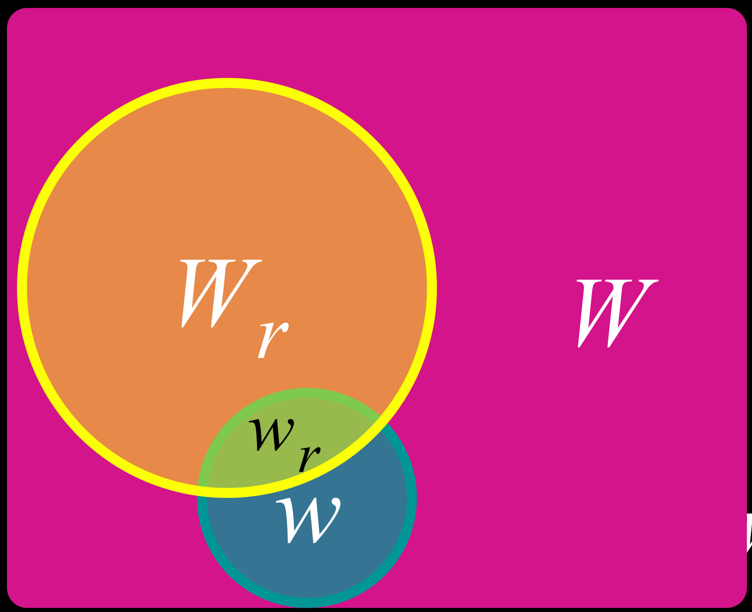
w is the rejection region.

W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^{n} (x_i - \mu_0)^2 = r^2$).

w_r is the intersection $W_r \cap w$.

Step 2 (Invoke the Neyman-Pearson Theorem):

Define W_r, W_p, w_r, w_p. Then by **Theorem 1** $P(\mathbf{x} \in w_r \mid \mathbf{x} \in W_r) = \alpha$ and $P(\mathbf{x} \in w_p \mid \mathbf{x} \in W_p) = \beta$.



W is the sample space.

$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

w is the rejection region.

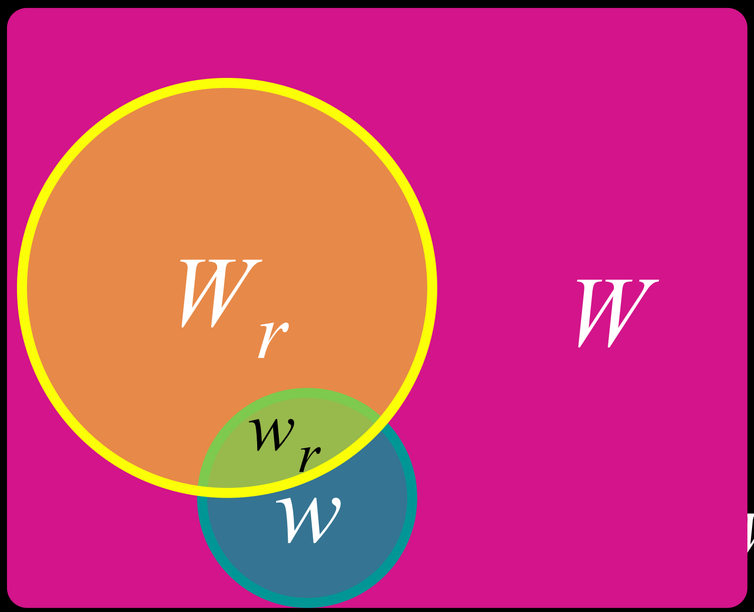
W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^{n}(x_i - \mu_0)^2 = r^2$).

w_r is the intersection $W_r \cap w$.

Step 3 (Use some clever geometry):

Note that normal distributions are constant on hyperspheres around their means.

By (S2) we know that w_r (and w_p) must be a constant proportion of the area of W_r (and W_p). Therefore $\int \cdots \int_{w_r} |\Delta| \, d\theta_1 \cdots d\theta_n = \alpha r^{n-1} K$ and $\int \cdots \int_{w_p} |\Delta_p| \, d\theta_1 \cdots d\theta_n = \beta p^{n-1} K$.



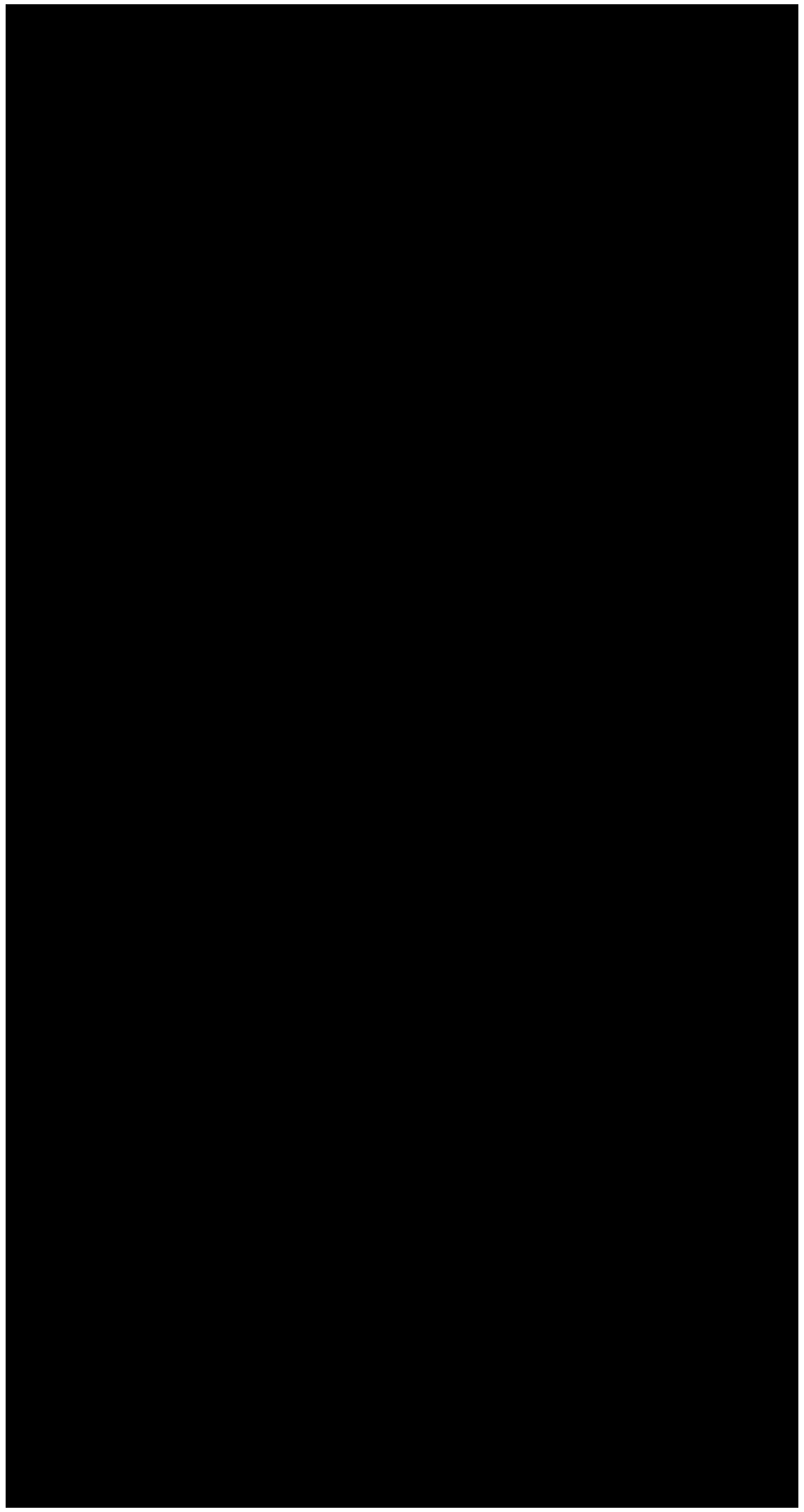
W is the sample space.

$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

w is the rejection region.

W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^{n} (x_i - \mu_0)^2 = r^2$).

w_r is the intersection $W_r \cap w$.

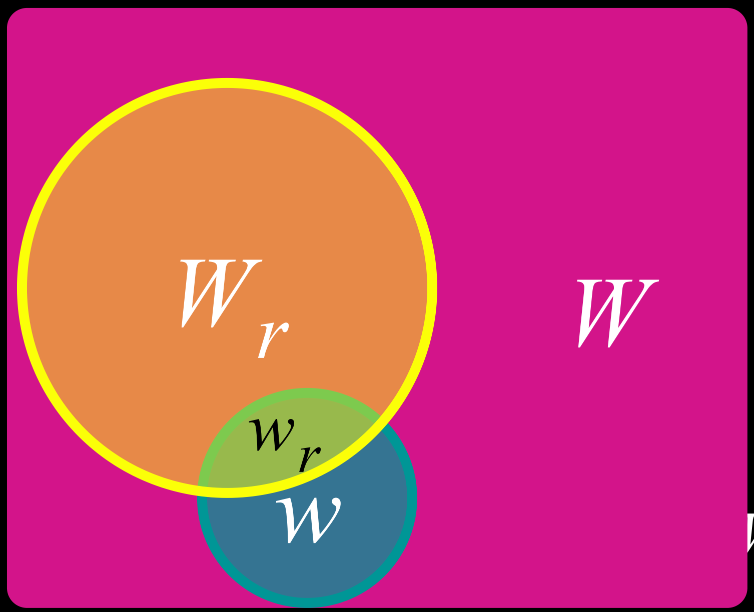


Step 4 (Invoke Triangle Inequality)

The distance from $\mu_{\mathbf{0}}$ to $\mathbf{x}$ is r, from $\mu_{\mathbf{1}}$ to $\mathbf{x}$ is p, and from $\mu_{\mathbf{0}}$ to $\mu_{\mathbf{1}}$ is $L = \sqrt{n}\,|\,\mu_0 - \mu_1\,|$. By the triangle inequality we get $r \leq L + p$ and $p \leq r + L$.

If $g(t)$ is taken to be an arbitrary monotone function, then the inequality is preserved*.

* or flipped, if $g(t)$ is monotonically decreasing.



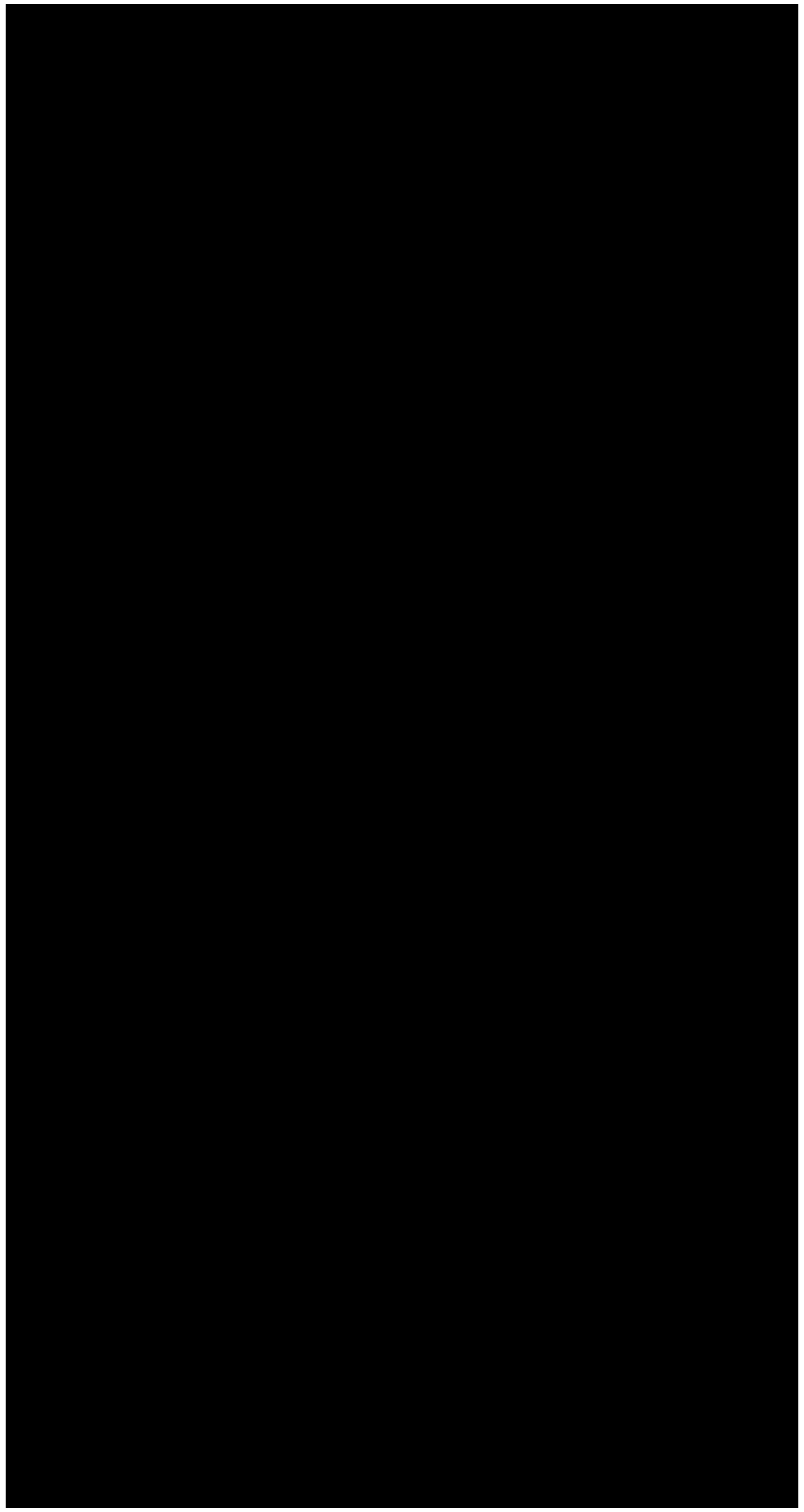
W is the sample space.

$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

w is the rejection region.

W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^{n}(x_i - \mu_0)^2 = r^2$).

w_r is the intersection $W_r \cap w$.

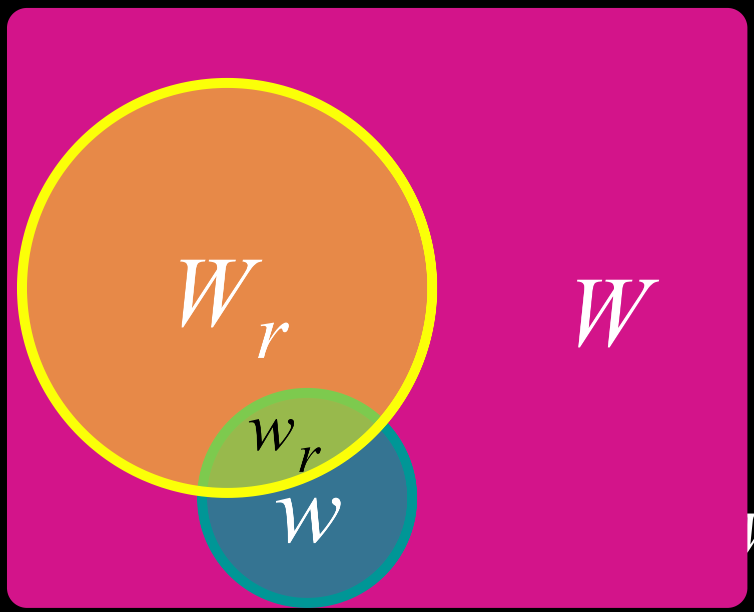


Step 5 (Integrate over our region):

Define $I_r(g) = \int_w g(r)dx_1 \cdots dx_n$ which is transformed to $I_r(g) = \int_w g(r)\,|\,\Delta\,|\,dr d\theta_2 \cdots d\theta_n$. We can compute

$$I_r(g) = \alpha K \int_0^\infty r^{n-1} g(r) dr.$$

Also: $I_p(g) = \beta K \int_0^\infty p^{n-1} g(p) dp$ and $I_{p+L}(g) = \beta K \int_0^\infty g(p+L) p^{n-1} dp$.



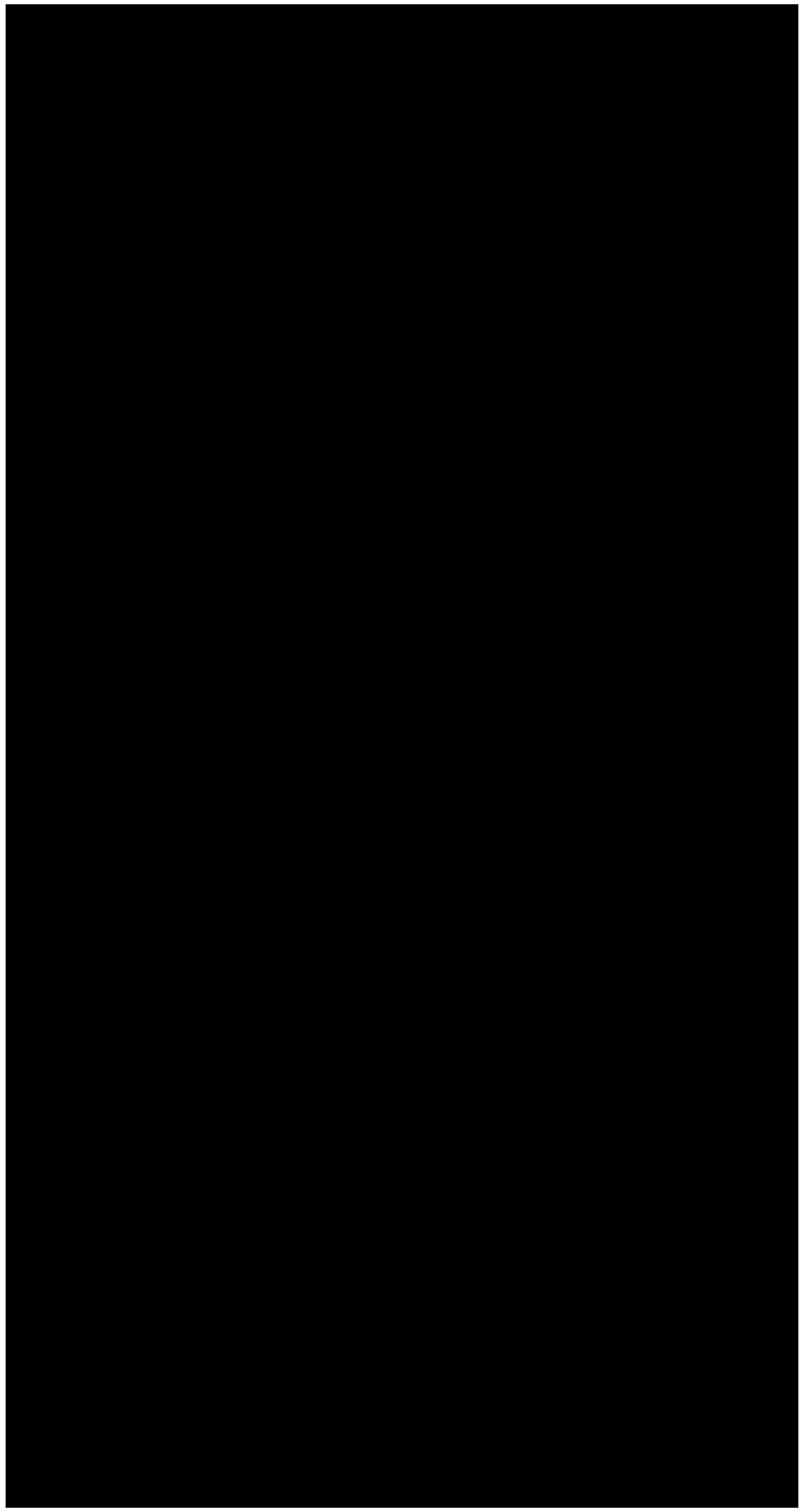
W is the sample space.

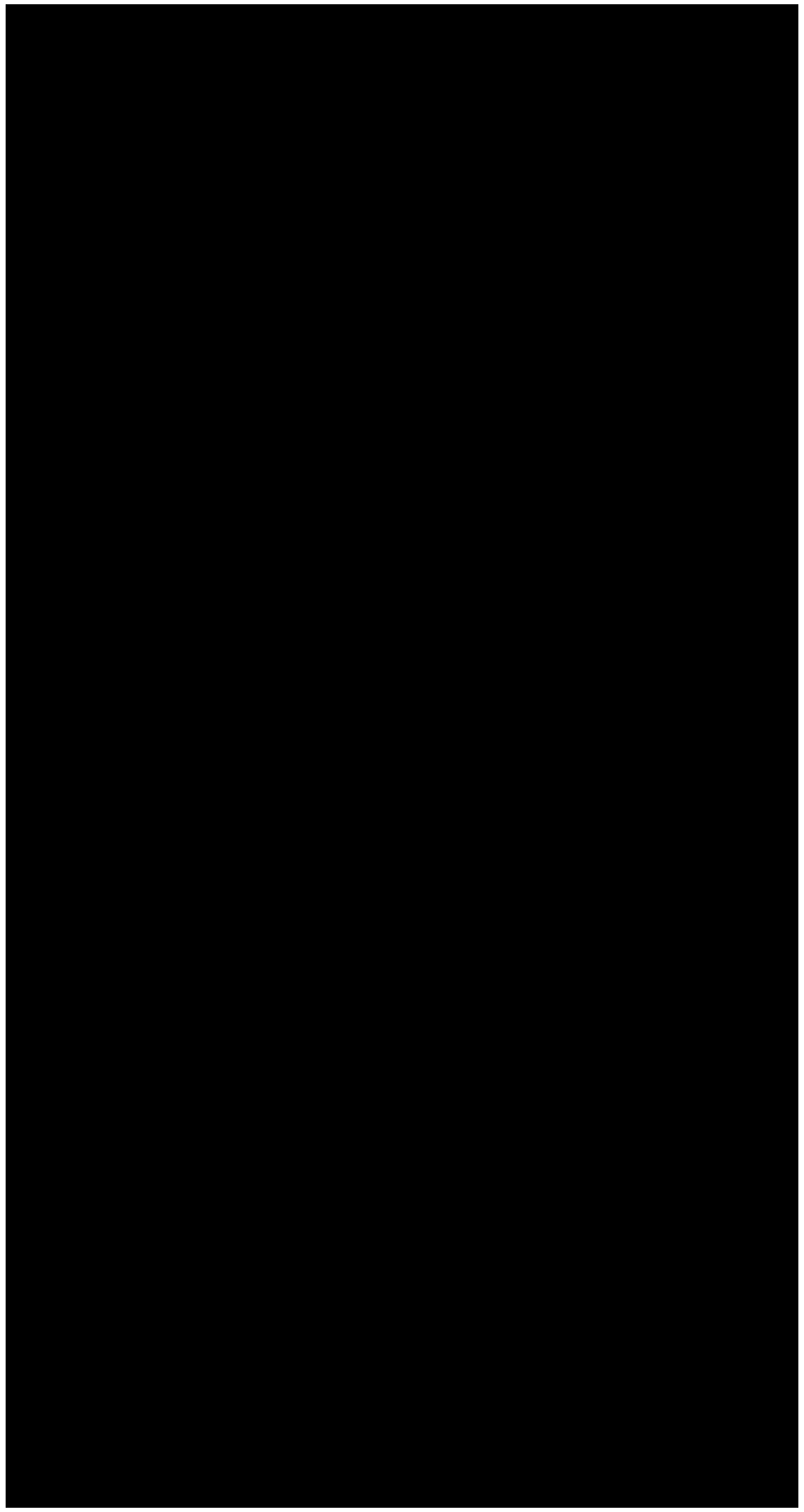
$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

w is the rejection region.

W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^n (x_i - \mu_0)^2 = r^2$).

w_r is the intersection $W_r \cap w$.



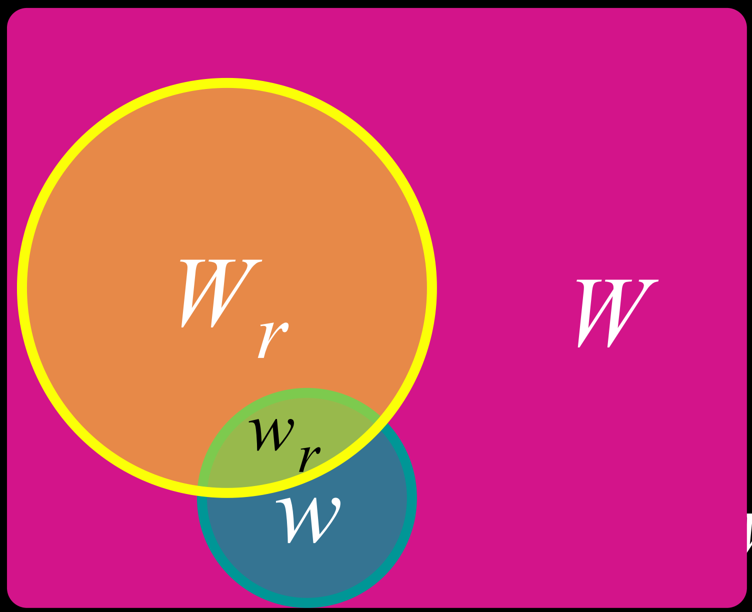


Step 6 (Fix the monotone function):

Take $g(t) = \exp(-ct)$ for $c \geq 0$.

Then $g(r) \geq g(p+L) = g(p)g(L)$.

Integrating gives $I_r = \alpha K \frac{\Gamma(n)}{c^n}, I_p = \beta K \frac{\Gamma(n)}{c^n}$ and $I_{p+L} = \beta K e^{-cL} \frac{\Gamma(n)}{c^n}$.



W is the sample space.

$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

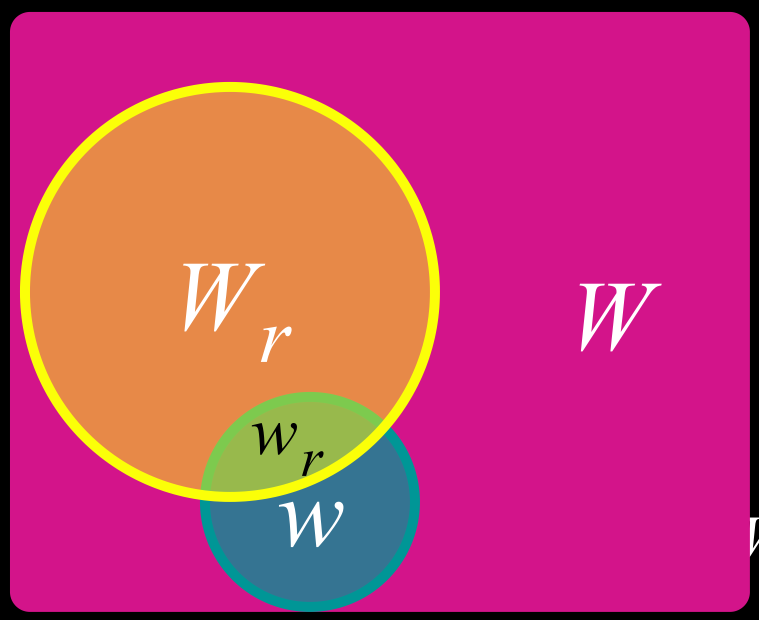
w is the rejection region.

W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^{n}(x_i - \mu_0)^2 = r^2$).

w_r is the intersection $W_r \cap w$.

<ins>Step 7 (Simplify and Arrive at Contradiction):</ins>

Simplifying (since $K > 0$) we get: $\alpha \geq \beta e^{-cL}$ and by symmetry $\beta \geq \alpha e^{-cL}$. Therefore, $\alpha = \beta$.



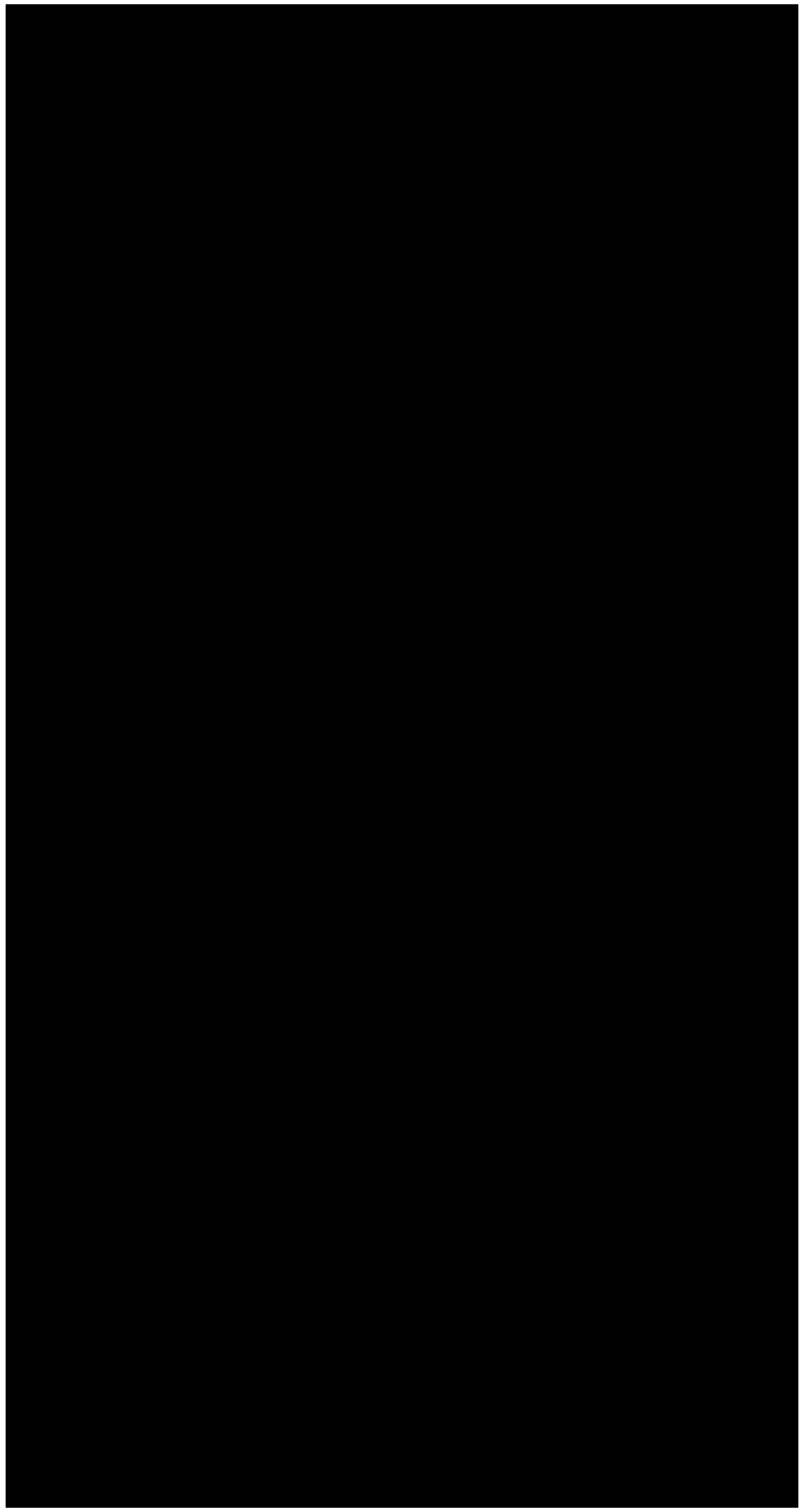
W is the sample space.

$\mathbf{x} = (x_1, \ldots, x_n)$ is a sample point.

w is the rejection region.

W_r is an n-dimensional hypersphere (i.e. $\sum_{i=1}^{n}(x_i - \mu_0)^2 = r^2$).

w_r is the intersection $W_r \cap w$.



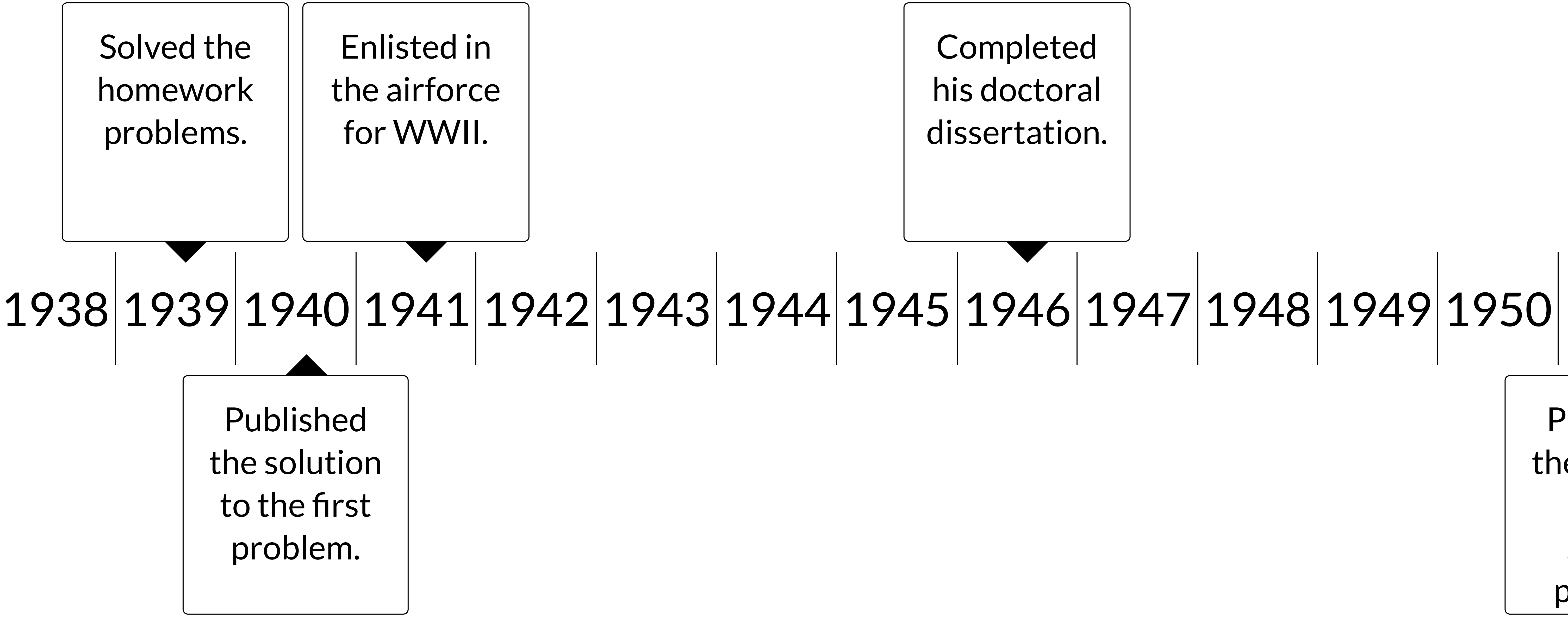
Q.E.D.

Q.E.D.

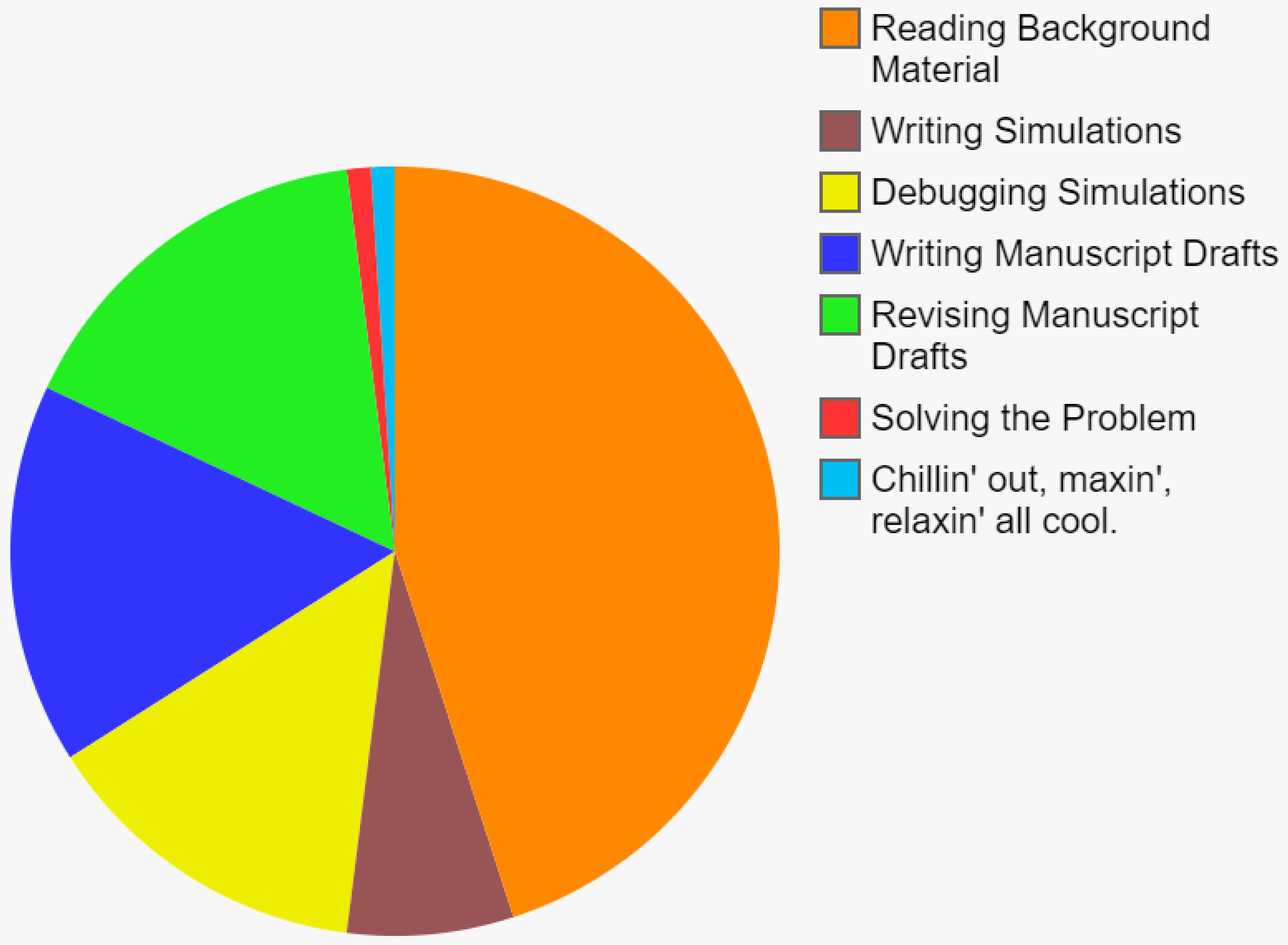

skeptical that this proof evaded
EVERYONE?
ARE YOU NOT ~~ENTERTAINED?~~

Myth #4

The Six Week PhD…


Solved the homework problems.
Enlisted in the airforce for WWII.
Completed his doctoral dissertation.
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
Published the solution to the first problem.

Time Spent Doing PhD "Research"



The True Story
of Dantzig’s Homework

n (University of Waterloo) **Nathaniel T. Stevens** (University of Waterloo)
Distributions with the Probability of Agreement / Comparaison des distributions avec pro-
oncordance

iversity of Waterloo) **Pengfei Li** (University of Waterloo) **Changbao Wu** (University of

ric Empirical Likelihood Inference with Estimating Equations under Density Ratio Mod-
e semi-paramétrique de vraisemblance empirique avec équations d'estimation en fonction
e ratio de densités

niversity of Waterloo) **Michael Wallace** (University of Waterloo) **Mary E. Thompson**
f Waterloo)
eatment Regimes with Interference / Régimes de traitement dynamique avec in-

(University of Waterloo) **Changbao Wu** (University of Waterloo) **Leilei Zeng** (Univer-
loo)
ntervals for Fish Abundance Index with Survey Data / Intervalles de confiance de l'indice
des poissons comportant des données d'enquête

niversity of Waterloo) **Nathaniel T. Stevens** (Universi
x for Sample Size Determination with Comparative Pro
n de la taille d'échantillon avec mesures de probabilité
lahub (University of Waterloo)
's Introduction to Genomics / Introduction à la génomi
ersity of Waterloo) **Richard Cook** (University of Wa

esigns Involving Auxiliary Outcomes / Plans à deux

iversity of Waterloo) **Martin Lysy** (University of Wa

mate Inference for Spatial Extreme Value Models / Inférence approximative rapide pour
patiaux de valeur extrême
an (University of Waterloo)
ne Learning Algorithms for Finding the Topics of COVID-19 Open Research Dataset
y / Utilisation d'algorithmes d'apprentissage automatique pour trouver automatiquement
'ensemble de données de recherche ouvertes sur la COVID-19

University of Waterloo) **Mary E. Thompson** (University of Waterloo) **Changbao Wu**
f Waterloo)
nd Misclassified Binary Observations in Complex Surveys / Observations binaires
nal classées dans les enquêtes complexes

niversity of Waterloo) **Martin Lysy** (University of Waterloo) **Audrey Béliveau** (Univer-
loo)
netic Mark-Recapture Methods for Estimating Seasonal River Run Size of Stock Popula-
odes de marquage et de recapture génétique bayésienne pour estimer l'effectif saisonnier
on de rivière des populations de stocks.

11:30-11:45 **Nam-Hwui Kim** (University of Waterloo) **Ryan Browne** (University
Topics in Component Merging in Model-based Clustering / Sujet
dans le cadre d'un partitionnement basé sur un modèle

11:30-11:45 **Augustine Wigle** (University of Waterloo) **Audrey Béliveau** (Univer
Investigating the Additivity Assumption in Component Network M
d'additivité dans la méta-analyse de réseau de composants

15:30-15:45 **Jiaxuan Mo** (University of Waterloo) **Martin Lysy** (University of W
Use of Laplace Approximation in Stochastic Differential Equation
Laplace dans des équations différentielles stochastiques

16:15-16:30 **Zhaohan Sun** (University of Waterloo) **Yeying Zhu** (University of W
Waterloo)
Noisy Matrix Completion for Longitudinal Data with Subjec
Complétion de la matrice de bruit pour les données longitudinale
et au temps

16:30-16:45 **Dylan Z Spicker** (University of Waterloo) **Michael Wallace** (Un
(University of Western Ontario)
ent Error Corrections with Non-IID Auxiliary Data / Co
s auxiliaires non IID

Kuang Yeh (University of Waterloo) **Gregory Rice** (University o
of Waterloo)
Real-time Updated Probabilistic Forecasts With Appli
Outcome Prediction / Évaluation des prévisions probabil
application aux prévisions de résultats de la National Basketball A

feng Xie (University of Waterloo) **Richard Cook** (University of
ple Properties under a Marker-Dependent Visit Process
cessus de visite dépendant de marqueurs

13:45-14:00 **Kelly A Ramsay** (University of Waterloo) **Shoja'eddin Chenouri** (U
Privatizing Data Depth Functions / Confidentialisation des fonctio

14:00-14:15 **Zehao Xu** (University of Waterloo) **Wayne Oldford** (University of W
Loon.tourr: Interactive Tour Techniques / Loon.tourr : techniques

16:00-16:30 **Avinash Prasad** (University of Waterloo) **Marius Hofert** (University
of Waterloo)
Dependence Modeling with Generative Neural Networks / Modé
réseaux de neurones génératifs

15:45-16:00 **Jie Jian** (University of Waterloo) **Peijun Sang** (University of Waterloo
Estimating Time-varying Networks from Multivariate Functional
dans le temps à partir de données fonctionnelles multivariées

16:30-16:45 **Pranav Subramani** (University Of Waterloo) **Nicholas Vadivelu** (Un
(University Of Waterloo) **Lawrence Murray** (Uber)
Sequential Parameter Learning of SEIR Models in Birch / Apprent
modèles SEIR sous Birch

We are too hard on ourselves. Our stories are not so different.

Thank You.

dylan.spicker@uwaterloo.ca