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Mathematics' Quirks: The Barber Paradox

By Taylor Lopez

I love paradoxes; they make people question the way that humans use some theories to interpret the world. Can things we take for common knowledge be incorrect? Does $1+1$ really equal 2? One of my favorite philosophers, Bertrand Russell, attempted to solve a paradox of set theory in his magnum opus *Principia Mathematica*. Russell's paradox can be described with a riddle, "If a barber shaves all and only those men in the village who do not shave themselves, does he shave himself?" Given this statement to be true, who shaves the barber's beard? We can break this down into mathematical terms to try and draw a conclusion.

A set is simply a grouping of numbers that we can describe, typically with a variable e.g. $A = \{1, 2, 3\}$. In English this reads, the set of A has the values one, two, and three, and A's size is three and that A doesn't contain itself. So given a set R that contains all sets whose members do not contain itself, does R contain itself? Can the barber shave himself without violating this predicate condition that he only shaves people who do not shave themselves? With naive set theo-

ry this problem can not be resolved. This paradox was discovered in 1901 by the aforementioned Bertrand Russell. At the time, this was a huge problem for the foundations of mathematics.

One hundred years previous, Gottlob Frege tried to develop a foundation for all mathematics using symbolic logic. Frege established connections like $x=5$, stating the the value of x is 5. This makes intuitive sense but leads to Russell's paradox. If we write $x = 5$ in set notation, we get that $x = \{n : n \text{ is an integer and } 4 < n < 6\}$. Seemingly, any description of x could fit in after the colon, e.g. $x = \{n : n \text{ is not in } n\}$, which was discovered by Russell and led to his paradox. When Russell discovered this paradox, Frege immediately saw that it had a devastating effect on his system. Even so, he was unable to resolve it, and there have been many attempts in the last century to avoid it. Russell's solution is to enable a hierarchy of types that inherit from each other. He undertook this mission to essentially prove the fundamentals of mathematics from purely logical axioms. Allowing for consistent logical statements

that couldn't create a loop like Russell's paradox. After publishing the three volumes of *Principia Mathematica* in 1910, 1912, 1913, and a second edition in 1927, his work was highly regarded as the greatest logical theory since Aristotle's *Organon*. Unfortunately Kurt Gödel's incompleteness theorem that finally showed that the *Principia Mathematica* could not be both consistent and complete.

So the answer to the riddle: it depends on what type of set theory you use. You can remove the barber from the set of people who do not shave themselves, you can say the barber is female and doesn't have the characteristics of someone who needs a shave, etc. There is no definitive answer and this reality doesn't allow mathematics to be based in pure logical axioms, we have to make intuitive assumptions about math. Our current understanding could be incorrect, does $1+1$ really equal 2? Does the barber get to keep his fantastic moustache? I urge you to take a dive into math, look at its quirks, and explore its mysteries.

Leadership

By Jason Lee



Jason is a tutor here at Clovis Community College. He rides a motorcycle.

“He would spend entire days going back and forth between his targets, the distance growing continually, until one day he realized he was going around in a circle.”

Blake is a tutor here on campus. He enjoys energy drinks and black t-shirts.



WRITE NOW

Leadership: the elusive skill set that seems to require endless hours of training and overcomplicated procedures. I am no expert on the subject myself, but I have had a fair bit of experience with the good and the bad during my own attempts to be a leader. The golden rule to any leadership position is “Don’t be arrogant.” With any position comes a myriad of responsibilities, and the last thing

you’ll remember is the collective hours of learning points and lectures. Thus the best approach, as with any task, is to keep it simple and follow the aforementioned golden rule. That takes care of summing up the thrust of all leadership classes and advice so that you will not be going off and forgetting your prime directive. The largest misconception about leading is that you have a special role

where you mentor and delegate, etc. This is perfectly acceptable, but the bottom line is that you are really in that position for one specific purpose: make sure that the nonsense stops at your desk and does not make it to your team. Simply put, keep “it” from rolling downhill any further. For more tips and tricks on keeping it simple, just find the nearest Marine.

Stories and Legends

By Blake Wilson

Archibald Flechingham of Nockshire was an archer. He stood as tall as a sequoia and was as strong as thunder. He cloaked himself with entire fields of cotton and bathed in the largest of summer storms. Even as a child he towered over the mountains and roamed the forests freely, hunting for food for himself and his town. He wielded a bow with a three-ton draw, would use entire trees for

the shafts of his arrows, and was a deadly shot.

His shot was so precise that it was said he could shoot a wing off of a fly. He constantly challenged himself by shooting smaller and smaller targets, farther and farther away. He would spend entire days going back and forth

between his targets, the distance growing continually, until one day he realized he was going around in a circle.

At this revelation he began to tell others about how the earth was round and not flat; however, the people did not believe him. He tried to get them to follow him around the world but no one would go. So to prove his discovery he showed the people the only way he could think of. He climbed the tallest mountain in the area and placed a single apple on his head. He readied his stance and took his shot. After some time had passed his arrow came whizzing by, taking the apple off his head and not a hair more.

Despite his accuracy, there was one target that was always able to elude the strike of his arrow. The Moon. From birth, he aspired to hit that great target as it hung in the pitch black sky. Every night he would try to shoot the moon.

However, every time he

took a shot, his target would move across the sky and he would miss: piercing the thick black veil of the night leaving only a small pinhole of light. And no matter how far he lead his shot, he still could not hit it. After a while, he began to travel the world in search for the tallest mountain top so that he would be closer to his target.

Each day he would hike to the peak of the tallest mountains he could find with his bow and a quiver of arrows, and as soon as night fell he would begin to fire at his target. He tried tirelessly, night after night, to hit his mark until he had completely filled the entire sky with these small holes of light known to us as the stars. To this day he still wanders the earth hunting that great white beast, and if you watch closely you can see his arrows shoot across the night sky with a quick streak of light.

Joining the Conversation

Should Murderers' Names be Made Public?



Ramleen Boparai

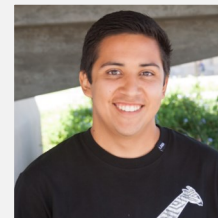
YES,

In 2015, there were 375 mass shootings in the US. The reasons behind these shootings? We may never know. Each killer is different. Most of them are not in the right state of mind during these shootings. But regardless of whatever the reason may be, the families that have to bear the tragic loss of their

loved ones, deserve to have a sense of peace. One of the ways that peace can be achieved could be by having the murderer's name reported in media. This might help give them reconciliation to the families and community that are affected by it. Others might argue that the name should not be reported in media because that was their whole purpose- to make sure that their name goes public. But most murderers can be mentally disturbed, so that might not be the first thing that comes to their mind. Even if media does try to hide the names of murderers, most people own social media accounts and can have the upper hand by posting their name on any account. It also allows families and the community to become known with their surroundings. People are forced to become knowledgeable about what's going around them. So allowing social media and other sources such as the news channel will not harm anyone but become more aware of the killings and it might help ease the tension with families. Everyone will come to know about these murderers and their heinous crimes and it might even help the ones that are suffering with consolation.

NO,

From mass shootings to a singular murder, a certain degree of delicacy is needed when presenting the information of the incident to the public. No doubt, the public is entitled to know about the various events occurring in their community; however, there are some pieces of information that can be omitted without compromising the integrity of the news story. One key piece of information that can be omitted is the name of the murderer(s). Releasing this information is not necessary mostly because there are cases where the people that commit such heinous crimes could be looking for the attention/fame that comes with having their name(s)/picture in the local, and sometimes national, news. Despite the murderer being painted all over the media for very negative reasons, he or she is still getting the attention that was intended. This publicity only opens up the opportunity for a series of copycat murders. One person might see that a murderer is getting a lot of attention in various media sources, and if they are searching for that type of attention, they might be compelled to follow the same path and commit the same crime which does not make the community any safer. However, if the murderer's name and picture are not present in the media and the masses are informed solely on the series of events that occurred during the crime, there is no threat of a person committing this crime primarily for the attention. Granted, this is not to say that the people committing murders are doing so to gain attention; it just prevents the opportunity of copycat murders for those that are.



Isaiah Trujillo

Essential Math Pick Up Lines

By Mary Papikian

- | | | |
|--|--|--|
| 1. Hey baby, what's your sine? | boyfriend. Mind if I do a you-substitution? | Could you replace my X without asking Y? |
| 2. Are you a 90 degree angle?
'Cause you are looking right! | 5. I'm not being obtuse, but you're acute guy/girl. | 8. You are the solution to my homogenous system of linear equations. |
| 3. My love for you is like pi...never ending. | 6. Our love is like dividing by zero...you cannot define it. | 9. Are you the square root of negative one? Cause you unreal! |
| 4. I don't like my current girlfriend/ | 7. I heard you're good at algebra— | |

TUTORS OF THE MONTH

“Kangaroos are the orange things with the long necks.”

Robbie is a writing tutor at CCC. He chases escaped wallaroos at the Fresno Chaffee Zoo.



WRITE NOW



Tessa Rosander

Tutor Subjects: Math 201, 103, 4A/B, 5A/B, 11, 17, 45; Stats 7; Bio 5

Major: Social Work and Public Health

Educational Path: attend Fresno State or Fresno Pacific

Some words to live by: “Do a loony-goony dance ‘cross the kitchen floor, put something silly in the world that ain’t been there before.”

—Shel Silverstein

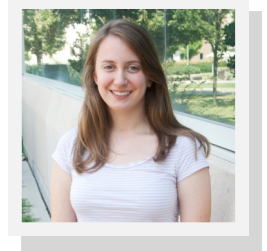
Lauren Manfredi-Smith

Tutor Subjects: English 252-3; Comm 1; PoliSci 2; Psy 2

Major: Psychology

Educational Path: wants to get PhD from UCLA

Some words to live by: “It’s just a spark, but it’s enough to keep me going.” — Paramore “Last Hope”



Working at the Zoo

By Robbie Hill

As you might imagine, I get some pretty strange questions from guests as they aimlessly wander through the zoo, which is easily the most entertaining part of my workday. “How come y’all don’t have possums here” is one of my favorites. Why in the world would someone look for possums when there are lions right behind them? I have been asked many outlandish questions like this and they usually leave me scratching my head.

The most confusing encounter I have had with a guest was when an elderly woman was in search of her favorite animal. She approached me when I was walking by the kangaroo exhibit and politely

asked, “Excuse me sir, where are the kangaroos?”

I was thoroughly confused, considering we were standing right next to the kangaroo exhibit. I pointed right at them and said, “Right over here ma’am.” I could tell she was not pleased with this answer because she proceeded to lecture me about how the animals we were standing next to were in fact not kangaroos. At this point I had no idea what was going on, because I knew that the kangaroos were hopping around in front of my very own eyes. I wondered to myself: “Am I dreaming? Did I not pay enough attention during the zoo animal unit in kindergarten?” I would be hard-pressed to think of a time during which I was more confused than this.

The woman finally said,

“Kangaroos are the orange things with the long necks.” This lady had mistaken giraffes for kangaroos! Not only did she think that giraffes were called kangaroos, she also thought they were orange! It took every fiber of my being to not break out into hysterical laughter, but I maintained my professional demeanor and explained to her that she was just a little confused.

This is only *one* of the many weird encounters I have had with zoo guests and I am sure it will not be the last. Although they might cause me to momentarily question my knowledge of the animal kingdom, the quirky questions that visitors ask make my work at the zoo more enjoyable.

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WORD OF
THE MONTH BY SPENCER SHADLEY

MISANTHROPE: \ 'mi-sən-, thrōp\

NOUN

1. A person who hates or mistrusts human kind

Example: A common consequence of spending too much time in airports during the holidays is the temporary development of misanthropic attitudes.

Math It!

By Benjamin Bohan

A Party in Your Drink

By Samuel Montgomery

Boba—who knew one little word could bring so much joy to tea-lovers all over Fresno? I may seem to exaggerate, and perhaps this boba craze may just be another passing “food fad”—like avocado, kale, or sriracha-flavored everything—yet I am hoping that boba (and all of the delicious tea that is often paired with it) is here to stay.

If boba is foreign to you, you may be wondering what exactly this craze is all about. First off, the boba in boba tea (also popularly known

as “bubble tea”) are chewy, bland, yet bitter-sweet pearl-sized tapioca balls that are put into a cold tea or slush. These “bubbles” are often made from the cassava root, a vegetable that originated in South America (“What”). Oftentimes, sweet potato starch and sugar are both added in order to color the tapioca pearls black; in addition, these two ingredients can be substituted with chamomile and caramel in order to create white boba.

From reviewing the ingredients above, this topping may sound odd to say the least. But, if you are ever in the mood to try something

new, I highly encourage you try boba. It adds a unique, chewy texture to your drink, and is, in a curious way, fun! And, because of its thick substance, it is simultaneously a meal and a drink. When first trying it, I recommend drinking it with Thai tea (another personal favorite that is also a “food fad”), which you can purchase at local teahouses, such as *Taipei 101* (Cedar and Herndon), *15 Tea* (Blackstone and Nees), and *1920 Tea Club* (Bullard and Palm). Happy boba drinking!



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- Music Appreciation
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- RELAX
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- SNOWBOARD
- TRAVEL
- TURTLENECK

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