

## 1. Math education

### The Evolution of Math Teaching

- 1960s: A peasant sells a bag of potatoes for \$10. His costs amount to  $\frac{4}{5}$  of his selling price. What is his profit?
- 1970s: A farmer sells a bag of potatoes for \$10. His costs amount to  $\frac{4}{5}$  of his selling price, that is, \$8. What is his profit?
- 1970s (new math): A farmer exchanges a set P of potatoes with set M of money. The cardinality of the set M is equal to 10, and each element of M is worth \$1. Draw ten big dots representing the elements of M. The set C of production costs is composed of two big dots less than the set M. Represent C as a subset of M and give the answer to the question: What is the cardinality of the set of profits?
- 1980s: A farmer sells a bag of potatoes for \$10. His production costs are \$8, and his profit is \$2. Underline the word "potatoes" and discuss with your classmates.
- 1990s: A farmer sells a bag of potatoes for \$10. His or her production costs are 0.80 of his or her revenue. On your calculator, graph revenue vs. costs. Run the POTATO program to determine the profit. Discuss the result with students in your group. Write a brief essay that analyzes this example in the real world of economics.

### Top ten excuses for not doing homework:

- I accidentally divided by zero and my paper burst into flames.
- Isaac Newton's birthday.
- I could only get arbitrarily close to my textbook. I couldn't actually reach it.
- I have the proof, but there isn't room to write it in this margin.
- I was watching the World Series and got tied up trying to prove that it converged.
- I have a solar powered calculator and it was cloudy.
- I locked the paper in my trunk but a four-dimensional dog got in and ate it.
- I couldn't figure out whether  $i$  am the square of negative one or  $i$  is the square root of negative one.
- I took time out to snack on a doughnut and a cup of coffee.
- I spent the rest of the night trying to figure which one to dunk.
- I could have sworn I put the homework inside a Klein bottle, but this morning I couldn't find it.

A student comes to the department with a shiny new cup, the sort of which you get when having won something. He explained:

I won it in the MD Math Contest. They asked what  $7 + 7$  is. I said 12 and got 3rd place!

Two male mathematicians are in a bar. The first one says to the second that the average person knows very little about basic mathematics. The second one disagrees, and claims that most people can cope with a reasonable amount of math.

The first mathematician goes off to the washroom, and in his absence the second calls over the waitress. He tells her that in a few minutes, after his friend has returned, he will call her over and ask her a question. All she has to do is answer one third x cubed.

She repeats "one thir -- dex cue"?

He repeats "one third x cubed".

Her: 'one third x cubed'? Yes, that's right, he says. So she agrees, and goes off mumbling to herself, "one third x cubed..."

The first guy returns and the second proposes a bet to prove his point, that most people do know something about basic math. He says he will ask the blonde waitress an integral, and the first laughingly agrees. The second man calls over the waitress and asks "what is the integral of x squared?"

The waitress says "one third x cubed" and while walking away, turns back and says over her shoulder "plus a constant!"

A somewhat advanced society has figured how to package basic knowledge in pill form.

A student, needing some learning, goes to the pharmacy and asks what kind of knowledge pills are available. The pharmacist says "Here's a pill for English literature." The student takes the pill and swallows it and has new knowledge about English literature!

"What else do you have?" asks the student.

"Well, I have pills for art history, biology, and world history," replies the pharmacist.

The student asks for these, and swallows them and has new knowledge about those subjects.

Then the student asks, "Do you have a pill for math?"

The pharmacist says "Wait just a moment", and goes back into the storeroom and brings back a whopper of a pill and plunks it on the counter.

"I have to take that huge pill for math?" inquires the student.

The pharmacist replied "Well, you know math always was a little hard to swallow."

## **2. Definitions**

The difference between an introvert and extrovert mathematicians is: An introvert mathematician looks at his shoes while talking to you. An extrovert mathematician looks at your shoes.

## **3. A mathematician and ...**

An engineer, a physicist and a mathematician are staying in a hotel.

The engineer wakes up and smells smoke. He goes out into the hallway and sees a fire, so he fills a trash can from his room with water and douses the fire. He goes back to bed.

Later, the physicist wakes up and smells smoke. He opens his door and sees a fire in the hallway. He walks down the hall to a fire hose and after calculating the flame velocity, distance, water pressure, trajectory, etc. extinguishes the fire with the minimum amount of water and energy needed.

Later, the mathematician wakes up and smells smoke. He goes to the hall, sees the fire and then the fire hose. He thinks for a moment and then exclaims, "Ah, a solution exists!" and then goes back to bed.

A mathematician, a physicist, and an engineer were traveling through Scotland when they saw a black sheep through the window of the train.

"Aha," says the engineer, "I see that Scottish sheep are black."

"Hmm," says the physicist, "You mean that some Scottish sheep are black."

"No," says the mathematician, "All we know is that there is at least one sheep in Scotland, and that at least one side of that one sheep is black!"

A mathematician, a physicist, and an engineer are all given identical rubber balls and told to find the volume. They are given anything they want to measure it, and have all the time they need. The mathematician pulls out a measuring tape and records the circumference. He then divides by two times pi to get the radius, cubes that, multiplies by pi again, and then multiplies by four-thirds and thereby calculates the volume. The physicist gets a bucket of water, places 1.00000 gallons of water in the bucket, drops in the ball, and measures the displacement to six significant figures. And the engineer? He writes down the serial number of the ball, and looks it up.

The physicist and the engineer are in a hot-air balloon. Soon, they find themselves lost in a canyon somewhere. They yell out for help: "Helllllooooo! Where are we?"

15 minutes later, they hear an echoing voice: "Helllllooooo! You're in a hot-air balloon!!"

The physicist says, "That must have been a mathematician."

The engineer asks, "Why do you say that?"

The physicist replied: "The answer was absolutely correct, and it was utterly useless."

Dean, to the physics department. "Why do I always have to give you guys so much money, for laboratories and expensive equipment and stuff. Why couldn't you be like the math. department - all they need is money for pencils, paper and waste-paper baskets. Or even better, like the philosophy department. All they need are pencils and paper."

A mathematician organizes a lottery in which the prize is an infinite amount of money. When the winning ticket is drawn, and the jubilant winner comes to claim his prize, the mathematician explains the mode of payment: "1 dollar now, 1/2 dollar next week, 1/3 dollar the week after that..."

When a statistician passes the airport security check, they discover a bomb in his bag. He explains. "Statistics shows that the probability of a bomb being on an airplane is 1/1000. However, the chance that there are two bombs at one plane is 1/1000000. So, I am much safer..."

An engineer and a topologist were locked in the rooms for a day with a can of food but without an opener. At the end of the day, the engineer is sitting on the floor of his room and eating from the open can: He threw it against the walls until it cracked open. In the mathematician's room, the can is still closed but the mathematician has disappeared. There are strange noises coming from inside the can...

When it is opened and the mathematician crawls out. "Damn! I got a sign wrong..."

### **Quotes from math students and lecturers**

"The problems for the exam will be similar to the discussed in the class. Of course, the numbers will be different. But not all of them. Pi will still be 3.14159... "

"Do you love your math more than me?"

"Of course not, dear - I love you much more."

"Then prove it!"

"OK... Let  $R$  be the set of all lovable objects..."

A graduate student of mathematics who used to come to the University on foot

every day arrives one day on a fancy new bicycle. "Where did you get the bike from?" his friends asked. "It's a 'thank you' present", he explains, "from that freshman girl I've been tutoring. Yesterday she called me and told that she had passed her math final and wanted to drop by to thank me in person. She arrived at my place on her bicycle. When I had let her in, she took all her clothes off, smiled at me, and said: 'You can get from me whatever you desire!'" One of his friends remarks: "You made a really smart choice when you took the bicycle." "Yeah", another friend adds, "just imagine how silly you would have looked in a girl's clothes - and they wouldn't have fit you anyway!"

**Interesting Theorem:**

All positive integers are interesting.

Proof:

Assume the contrary. Then there is a lowest non-interesting positive integer. But, hey, that's pretty interesting! A contradiction.