What is the deal with Math?

The other day, I was with a group of friends at a restaurant. After eating a very nice meal, we all got the full tab. Rather than asking the waitress to split the tab, we decided that we would try to decide how to split up the tab ourselves. Many people started taking out their cell phones and using the calculator function.

By a show of hands, how many people have seen this happen? And by another show of hands, how many of you are the people taking out their cell phones?

When people take out their calculators instead of trying to do simple calculations, it saddens me. In fact, within my groups of friends, when people take out their calculators, it insults me. The ability to do simple math is such a fundamental skill that if we do not know how to do simple math, we lose a lot of useful ways of thinking about our decisions. Decisions like expected value analysis or cost-benefit analysis.

I want to tell you about some applications of math that I have found interesting and hope that we can all learn from at least one of the applications that I talk about today. There are 4 specific problems that I want to tell you about today: car rental calculations, the Sultan's Dowry Problem, Prisoner's Dilemma and the Monte Hall problem.

First, car rental calculations.

Station Wagon 55 25 89

You are on vacation and you want to rent a car, a station wagon more specifically. You know that there are two options when renting the station wagon. Option 1 is renting the car for a standard rate of 55$ and 25 cents per mile. Option 2 is renting the car for an unlimited mileage of 89$. How can we decide which is the better option for us?

After some simple algebra, we find that if we are traveling for more than 136 miles, we would choose option 2. If we traveled less than 136 miles, we would choose option 1.

Second, the Sultan's Dowry Problem.

The Sultan's Dowry Problem is where a sultan allows a commoner to marry one of his 100 daughters. Each daughter and her dowry are presented to the commoner one at a time. After each daughter, the commoner must decide whether to choose that daughter or to reject the daughter. After rejection, the commoner cannot go back and choose that daughter. If the commoner chooses the daughter with the largest dowry overall, then he will be allowed to marry that daughter. How does he best approach this problem?

Third, the Prisoner's Dilemma

Two suspects, A and B, are arrested by the police. The police have insufficient evidence for a conviction, and, having separated both prisoners, visit each of them to offer the same deal: if one testifies for the prosecution against the other and the other remains silent, the betrayer goes free and the silent accomplice receives the full 10-year sentence. If both remain silent, both prisoners are sentenced to only six months in jail for a minor charge. If each betrays the other, each receives a five-year sentence. Each prisoner must make the choice of whether to betray the other or to remain silent. However, neither prisoner knows for sure what choice the other prisoner will make. So this dilemma poses the question: How should the prisoners act?

Lastly, the Monte Hall problem.

These 4 problems all have ties to math. Math is not necessarily restricted to algebra like the car rental problem or calculus like the Sultan's Dowry problem or probability like the Monte Hall problem but also to logic like the Prisoner's Dilemma. Math is all around us. I'm not saying that we should all stop using our calculus textbook as a doorstop, and I'm not saying that all of us need to understand every theory in math. What I am hoping is that we will open up our eyes to the world of math around us whether it be in renting cars, choosing a secretary, figuring out whether to squeal or not or even on a game show. So the next time you're at a restaurant with a large group of friends and the bill comes – if you're taking out your cell phone, it better be because you are calling me to divide the bill for you.