Problem of the Week
Number Two
February 1, 2016

Why do they never serve beer at a math party?

Because you can't drink and derive!

What kind of animal is good at calculus?

The tangent lion!

That's right, we have calculus jokes this week! Like this one: A constant function and e^x are walking calmly down the street. Suddenly the constant function sees a differential operator approaching and runs away. So e^x follows him and asks what's wrong. He replies, "There's a differential operator coming this way, and when we meet he'll differentiate me and I'll be gone! "Ah," says e^x, he won't bother *me*, I'm e to the x!" Then he walks on by himself. Later he meets the differential operator and says, "Hi, I'm e^x." The differential operator replies, "Hello, I'm $\frac{d}{dy}$."

It was worth taking calculus just to get that joke.

Here's another: A math professor calls a plumber to fix his sink. It takes the plumber a few minutes to replace a gasket. He says, "That's a hundred dollars." The math professor is aghast. "A hundred bucks for a few minutes work? I don't make anywhere near that kind of money." The plumber suggests that he change his line of work and join the plumbing company he works for. "But don't tell them you're good at math," he says. "They reject overqualified candidates."

Well, the mathematician takes him up on it and makes a career change. A year later the company CEO decides that the workers must improve their general education. The math professor joins the other plumbers in a night school class. The teacher asks the professor to give the formula for the area of a circle. The mathematician is woefully out of practice and cannot remember the formula. So he goes to the board, sketches some diagrams and formulas, and comes up with $-\pi r^2$. He knows this isn't right but can't find his error. Frustrated, he glances behind him.

Whereupon he sees his fellow plumbers whispering frantically, "Just swap the limits of integration!"

Enough of that. It's time for this week's problem:

There are five positive integers strictly less than 6, and 3 of these are factors of 6 (specifically: 1, 2, and 3). That means that 60% of the positive integers strictly smaller than 6 are factors of 6. What is the smallest positive integer n for which fewer than 1% of the positive integers less than n are factors of n?

*Submissions are due to Jason Rosenhouse by 5:00 on **Friday, February 5.** Solutions should be written on the back of an official POTW handout. Place your name, e-mail address, and the section numbers and professors of any math courses you are taking, in the **upper right corner** of the front of the page. One weekly winner will receive a five-dollar gift card from Starbucks. Solutions will be posted at this website, by the Monday after the problem is due:*

http://educ.jmu.edu/∼rosenhjd/POTW/Spring15.html