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Math 198
Talk 1
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Prompt. Prepare and give a 2-3-minute talk that begins with the phrase, "You wouldn't know it by looking at me, but...." You will not use slides, props, or the whiteboard for this talk. Your goal is a give a clear and compelling talk with a solid beginning, middle, and end.

Outline. You wouldn't know it by looking at me, but I have very long toes. Now, before I begin telling you some fun facts about ten of my favorite digits, I want to address the question that's probably on many of your minds: "Forest, why the heck did you choose this for your talk topic?"

Allow me to explain. Basically, it boils down to three points: first, 2-3 minutes is not long enough to build up a really involved personal anecdote, so I had to go with something simple and self-contained. Second, I deliberately wanted to pick something that's really hard to build a narrative around, since I figured it'd be instructive to practice doing so. And third, I just wanted to have fun.

So with that out of the way, let's dig right into it. I hope that right now, there's just one question on all of your minds: "well... just how long *are* your toes?" A natural question. I'll do my best to answer it.

Last night, I measured the toes on each of my feet separately. Let's talk briefly about experimental design here. In my trials, I started measurement from the end of that crease thing that separates adjacent toes, and took the length from that to the tip, not including nail. For the toes that have *two* adjacent creases, I simply chose the inner of the two to use as the standard. I didn't want to average the reading from each side, because that average corresponded less directly to a length you could *see*. Lastly, measurements were taken with my toes relaxed, and hence slightly curled. I did not use my hands to straighten them out for the measurements.

Now for the results. First, for each toe, the measurements were the same on both my left and right feet (toes are symmetric across the "me" axis, hence Noether's theorem implies total podiatric momentum is conserved), so I will not refer to things like my "left big toe" and "right big toe" separately.

Now, let's talk some numbers: My big toe is 6.0cm. My index toe, which is the next one in (going inwards from medial to lateral), is 5.4cm. My middle toe is — any guesses here? — that's right, it's 4.8cm. My ring toe breaks the arithmetic progression here and comes in at comfortable 4.6cm. And finally, my pinky toe is a quaint 3.2cm.

But maybe we've encountered a problem here: ultimately, those numbers likely mean little to any of you. After all: how big even is a centimeter? About the width of your pinky finger, maybe — but what're the error bars on that? What does it look like when you stack six of them together? It's hard to tell. Despite having been driven towards better visuospatial reasoning by selective pressures over the course of many millenia, many humans still struggle a lot with standardized length estimation. We can circumvent this problem somewhat with the injection of real-world comparisons — 6.5cm is *about* the length of the average thumb, 5.5cm is roughly the length of a large chicken egg, and 4cm is about the length of most matchsticks — but there's still something missing here: we don't really know how big toes are *supposed* to be.

For instance, who here can say authoritatively, *without looking*, that their index toe is shorter than a matchstick? Before you answer, there's a few things you should consider. First, you usually only look at matches when you're using them for something, in which case they're much closer to your eyes than your toes typically are, so this might bias you to perceive them as larger. They're

also certainly a lot *narrower* than the average toe, and this might contribute to your perception that *length* is their salient feature, thus further skewing your judgments.

It might help instead to take a statistical route. How big are my toes relative to the average? Unfortunately, I actually couldn't find any data about this online.

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