MATH 31, LECTURE 30

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§8.1. Arclength, continued.

The hyperbolic cosine function $f(x) = \cosh x$ appears in many ways in the real world. For example, the shape of a hanging cable or chain can be described using hyperbolic cosine; such a curve is called a "catenary" (*catena* is Latin for "chain"). Also, in architecture catenaries are used as arches. For more on this, look it up online:

`http://lmgtfy.com/?q=catenary`

In class, we found the arc length of $y = \cosh x$ from $x = 0$ to $x = b > 0$. Also see #40 in the book. Note that taking the derivative is a cinch, and finding the integral is also a cinch!

§8.2. Area of a Surface of Revolution.

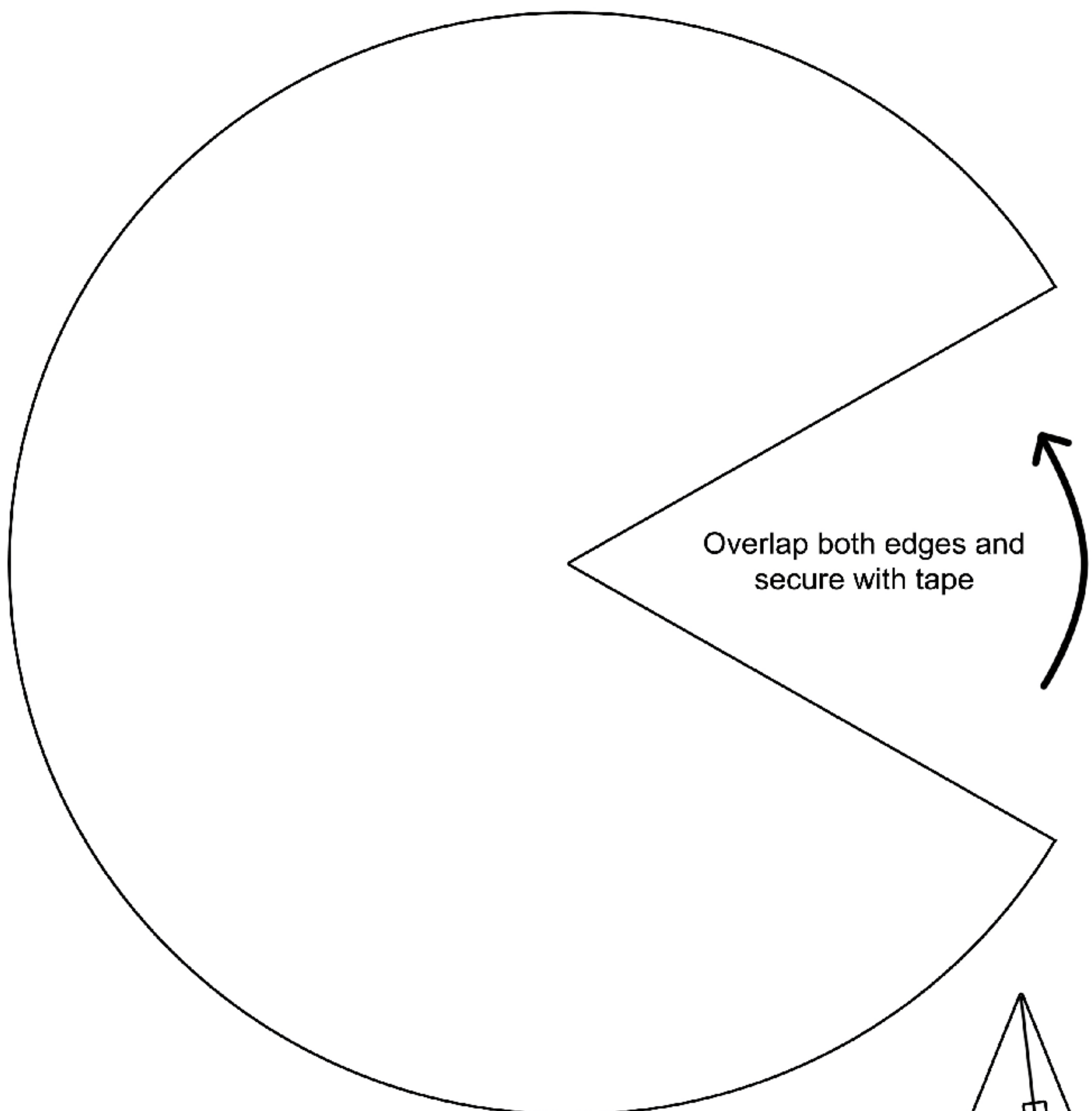
We used high school geometry to find the surface area of a cone (not including the area of the disc at the base). See the "cone-making kit" on the next page. Note that the Pac-Man shape makes an obtuse cone; how would you make an acute cone? I'm going to write a mystery novel in which the detective finds a dead body with an unrolled cone next to it, and he needs to figure out that it's the murder weapon.

Note: If we have a disc of radius ℓ, the θ-sector (with θ in radians) has area

$$\left(\frac{\theta}{2\pi}\right)\pi\ell^2 = \tfrac{1}{2}\ell^2\theta.$$

After all, $\frac{\theta}{2\pi}$ is the fraction(/proportion/percentage) of the whole disc.

We then found the surface area of a *truncated cone*, also called a *frustum* of a cone. It is the surface you get when taking a big cone and removing a little cone (the "ghost cone," to continue with the Pac-Man theme). Frusti (?) appear in real life as lampshades, etc.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