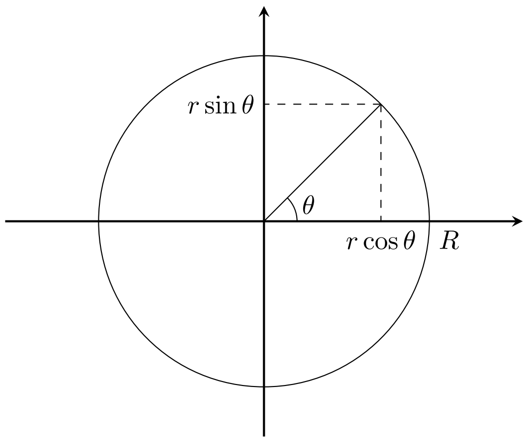
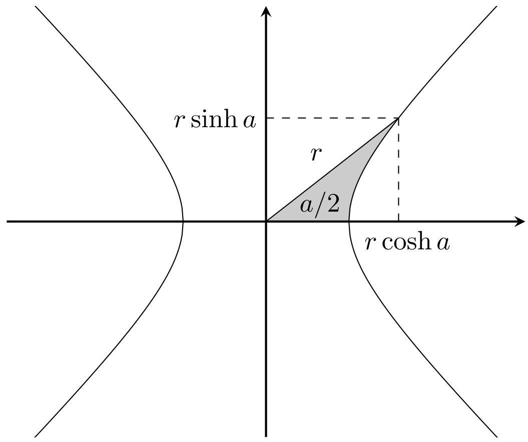
Hyperbolic functions are just like trigonometric functions, but for hyperbolas; that is, the sine hyperbolic and cosine hyperbolic functions output the vertical and horizontal projections respectively of the radial line which intersects the hyperbola - the area of the region enclosed by this line, the hyperbola, and the coordinate axis is half the paramater. Hyperbolas are defined as this: $x^2 - y^2 = a^2$.





And these are the relevant definitions, though they will not be on the test.

$$\sinh x = \frac{e^x - e^{-x}}{2} \tag{1}$$
$$\cosh x = \frac{e^x + e^{-x}}{2} \tag{2}$$
$$\tanh x = \frac{\sinh x}{\cosh x} \tag{3}$$
$$\coth x = \frac{\cosh x}{\sinh x} \tag{4}$$

Then we derived a useful formula for hyperbolic tangent;

$$\begin{aligned} \tanh x &= \frac{e^x - e^{-x}}{e^x + e^{-x}} \\ &\xlongequal[\frac{e^x}{e^{-x}}=e^{2x}]{\div e^{-x}} \frac{e^{2x} - 1}{e^{2x} + 1} \end{aligned}$$

And these hyperbolic functions have identities similar to the trigonometrics; for instance,

$$\cosh^2 x - \sinh^2 x = 1$$

Which can be proves by arithmetically working it out from the definition.