Group: ______________ Present: ____

Recall that a function $y = f(x)$ can be expressed parametrically as $x = t, y = f(t)$. Its inverse relation $x = f(y)$ can then be written parametrically as $x = f(t), y = t$.

1. Put your grapher in PAR and SIMUL modes. Set the window to $T \in [-2\pi, 2\pi, \frac{\pi}{24}], x \in [-2\pi, 2\pi, \frac{\pi}{2}], y \in [-2\pi, 2\pi, \frac{\pi}{2}]$

   Graph $y = \sin x$ as $X_{1T} = T, Y_{1T} = \sin(T)$

   Graph $x = \sin y$ (the inverse relation) as $X_{2T} = \sin(T), Y_{2T} = T$. (Use ZSQUARE to improve the appearance of the graph)

   Trace along both curves.

   Now change TMIN and TMAX so that the inverse relation is a function:

   $T \in [$___________, ___________, $\frac{\pi}{24}]$

   Conclusion: we define the inverse sine function by:

   $y = \sin^{-1}(x)$ means $x = \sin(y)$ and $y \in [$___________, ___________$]$.

   $\sin^{-1}(1) =$ ___________ because ___________________________________

   $\sin^{-1}(-\frac{1}{2}) =$ ___________ because ___________________________________

   $\sin^{-1}(-\frac{1}{\sqrt{2}}) =$ ___________ because ___________________________________

2. Repeat Number 1 with cosine replacing sine everywhere.

   Now change TMIN and TMAX so that the inverse relation is a function:

   $T \in [$___________, ___________, $\frac{\pi}{24}]$

   Conclusion: we define the inverse cosine function by:

   $y = \cos^{-1}(x)$ means $x = \cos(y)$ and $y \in [$___________, ___________$]$.

   $\cos^{-1}(0) =$ ___________ because ___________________________________

   $\cos^{-1}(-\frac{1}{\sqrt{2}}) =$ ___________ because ___________________________________

   $\cos^{-1}(-1) =$ ___________ because ___________________________________

3. Repeat Number 1 with tangent replacing sine everywhere.

   Now change TMIN and TMAX so that the inverse relation is a function:

   $T \in [$___________, ___________, $\frac{\pi}{24}]$

   Conclusion: we define the inverse tangent function by:

$y = \tan^{-1}(x)$ <u>means</u> $x = \tan(y)$ and $y \in ($____________, ____________$)$.

$\tan^{-1}(1) =$ ____________ because ____

$\tan^{-1}(\sqrt{3}) =$ ____________ because ____

$\tan^{-1}(-1) =$ ____________ because ____