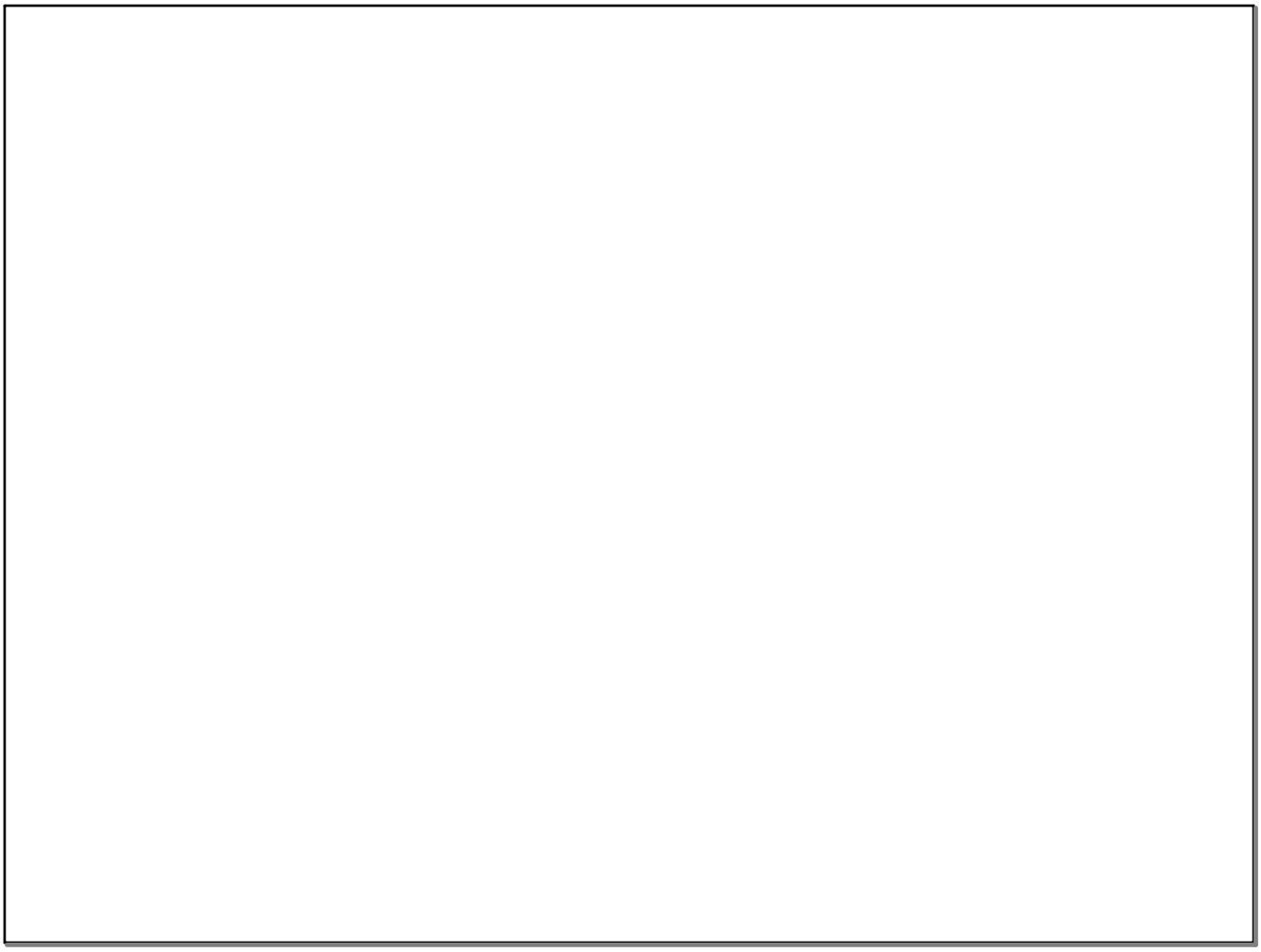
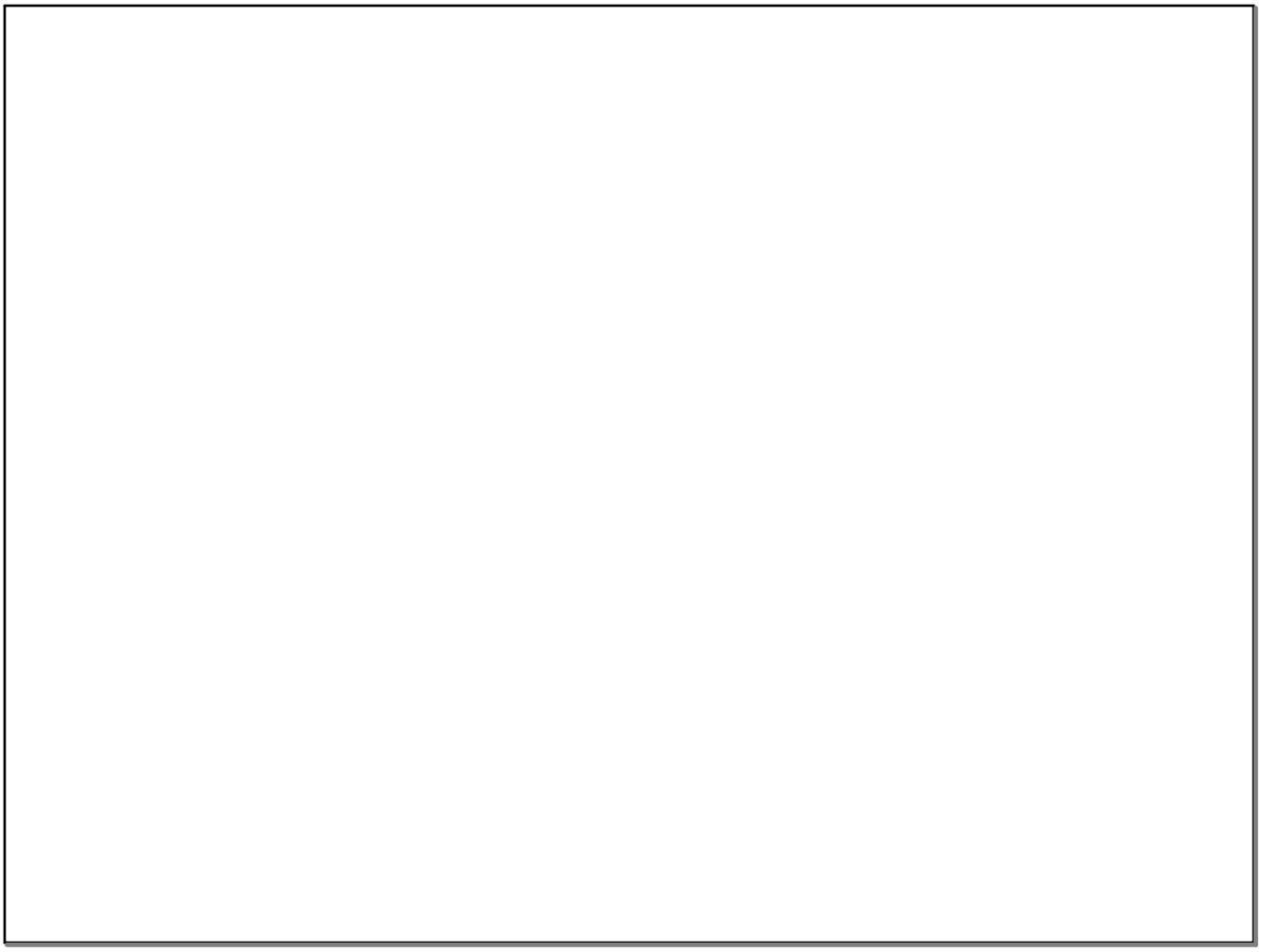
5.6 Inverse Trig Functions and Differentiation

Note: $\arcsin x = \sin^{-1} x \neq (\sin x)^{-1} = \csc x$

	Domain of y	Range of y
y=arcsinx iff siny=x	[-1,1]	$[-\pi/2,\pi/2]$
y=arccosx iff cosy=x	[-1,1]	$[0,\pi]$
y=arctanx iff tany=x	$(-\infty,\infty)$	$(-\pi/2,\pi/2)$
y=arccotx iff coty=x	$(-\infty,\infty)$	$(0,\pi)$
y=arcsecx iff secy=x	$(-\infty,-1]\cup[1,\infty)$	$[0,\pi/2)\cup(\pi/2,\pi]$
y=arccscx iff cscy=x	$(-\infty,-1]\cup[1,\infty)$	$[-\pi/2,0)\cup(0,\pi/2]$





ex. $\arcsin\frac{1}{2}$

ex. $\arccos\frac{\sqrt{3}}{2}$

ex. $\arctan\left(-\sqrt{3}\right)$

ex. $\arctan(2x-3) = \frac{\pi}{4}$

ex. $\cos(\arcsin(5/13))$

ex. $\cot(\arcsin(-1/2))$

ex. Find y' if $y = \arctan(5x + 3)$

ex. Find y' if $y = \arccos\left(e^{3x}\right)$

Derivatives of inverse trig functions

$$\frac{d}{dx}\arcsin u=\frac{u'}{\sqrt{1-u^2}} \qquad \frac{d}{dx}\operatorname{arccsc} u=\frac{-u'}{|u|\sqrt{u^2-1}}$$

$$\frac{d}{dx}\arccos u=\frac{-u'}{\sqrt{1-u^2}} \qquad \frac{d}{dx}\operatorname{arcsec} u=\frac{u'}{|u|\sqrt{u^2-1}}$$

$$\frac{d}{dx}\arctan u=\frac{u'}{1+u^2} \qquad \frac{d}{dx}\operatorname{arccot} u=\frac{-u'}{1+u^2}$$