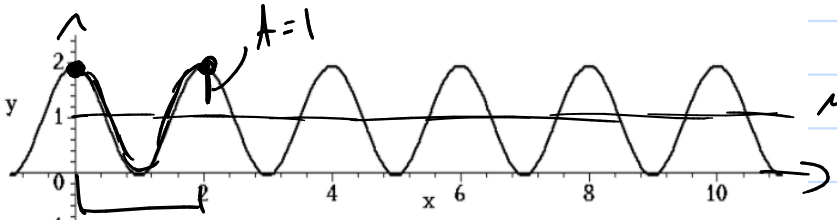
Math 112

Q's

10.5 #7

$A\cos(\omega x+\phi)+B$

The figure



shows the graph of the function

$f(x) =$ $\cos(\pi x)+1$.

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6 Suppose $y = -4\cos(9t+6)+3$. In your answers, enter *pi* for π.

What is the phase shift? $-\frac{6}{9} = -\frac{2}{3}$

$A\cos(\omega t+\phi)+B$

period $= \frac{2}{9}\pi$

amplitude $= 4$

vertical shift $= 3$

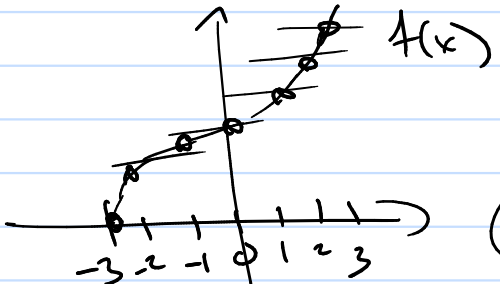
① $|A|$ is amplitude

② period $= \frac{2\pi}{\omega}$

③ B is vertical shift

④ $-\frac{\phi}{\omega}$ is phase shift

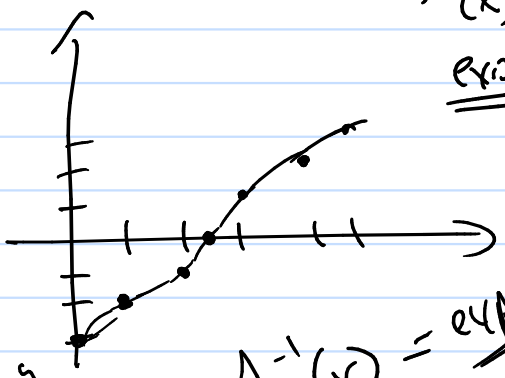
Inverse functions:



x	y
-3	0
-2	1
-1	2
0	2.5
1	3
2	4
3	5

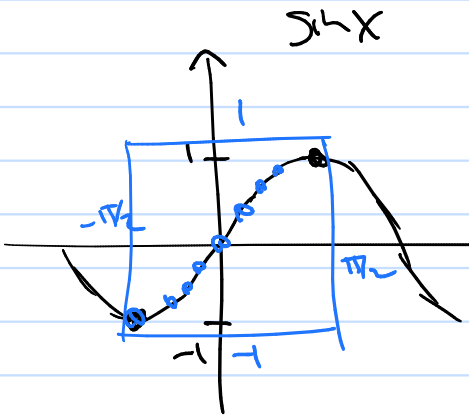
passes horz. line test

Swap x, y

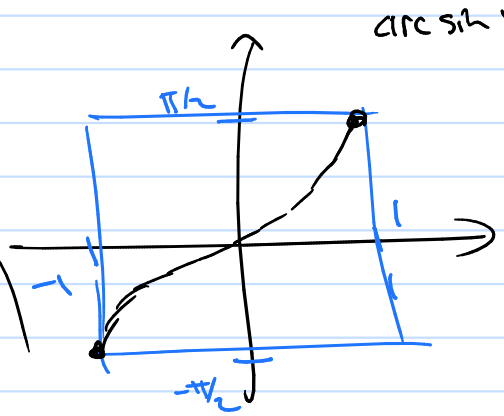


x	y
0	-3
1	-2
2	-1
2.5	0
3	1
4	2
5	3

$f^{-1}(x) =$ expression



Swap x, y



Fact

$$f(f^{-1}(x)) = x$$

D: $[-\pi/2, \pi/2]$
R: $[-1, 1]$

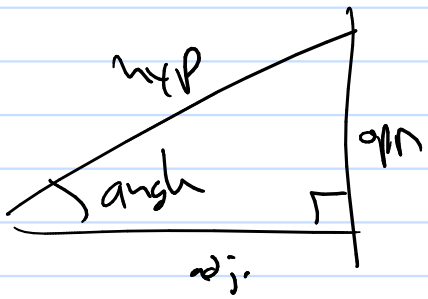
D: $[-1, 1]$ ←
R: $[-\pi/2, \pi/2]$

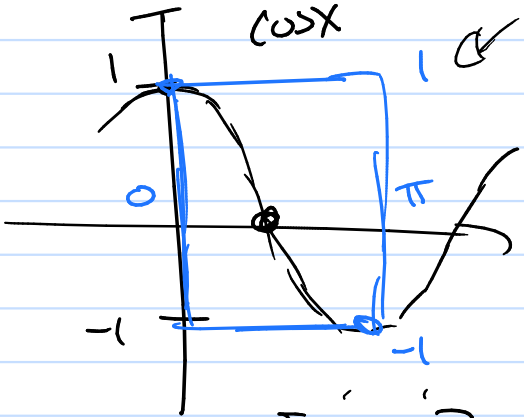
$\sin(\arcsin(x)) = x \quad -1 \le x \le 1$

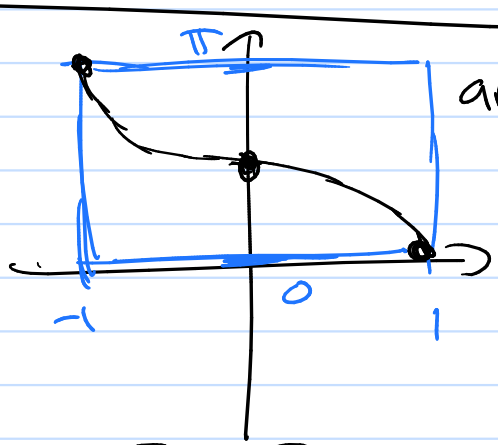
$\arcsin(\sin(x)) = x \quad -\pi/2 \le x \le \pi/2$

remember $\sin(\text{angle}) = \text{ratio}$

$\leadsto \arcsin(\text{ratio}) = \text{angle}$





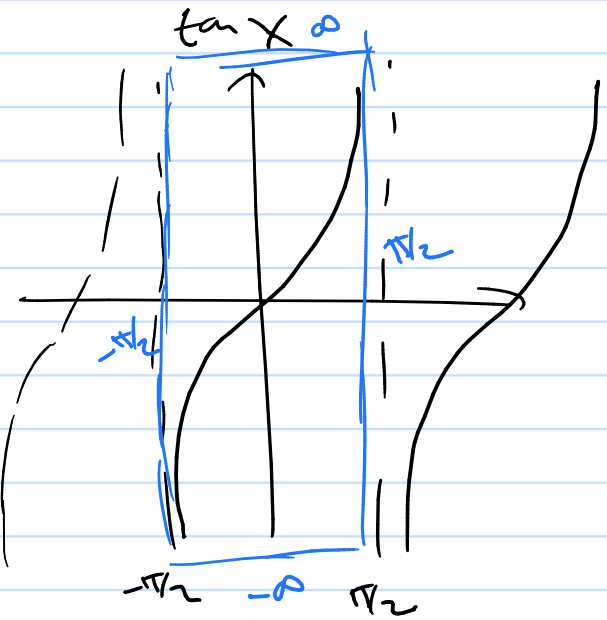


D: $[0, \pi]$
R: $[-1, 1]$

D: $[-1, 1]$
R: $[0, \pi]$

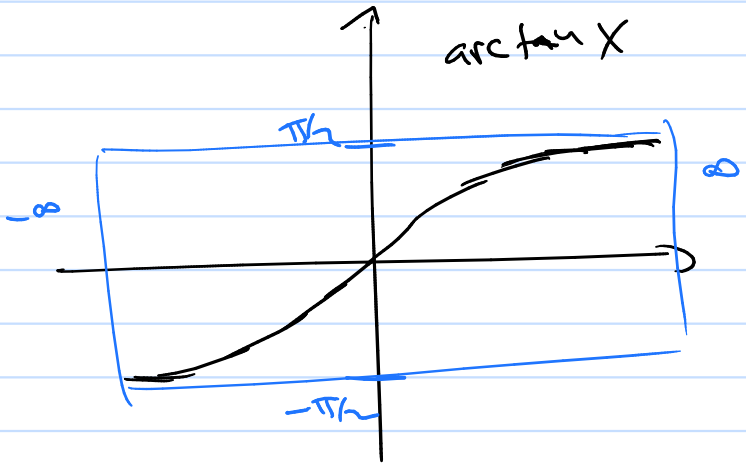
$\arccos(\cos(x)) = x \quad 0 \le x \le \pi$

$\cos(\arccos(x)) = x \quad -1 \le x \le 1$



D: $(-\pi/2, \pi/2)$

R: $(-\infty, \infty)$

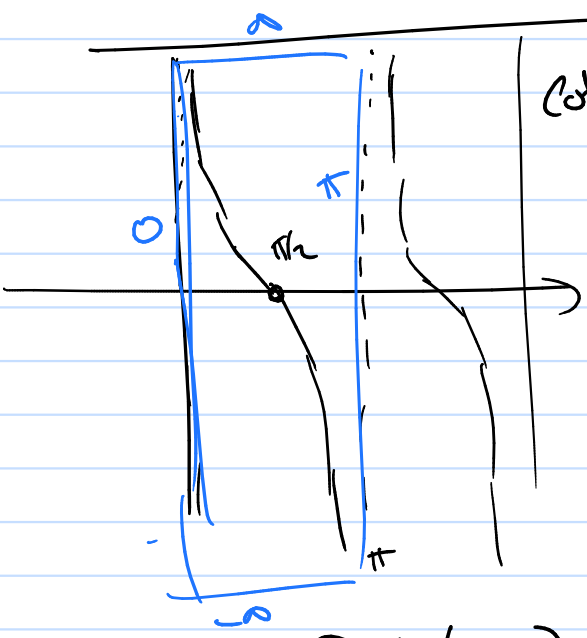


D: $(-\infty, \infty)$

R: $(-\pi/2, \pi/2)$

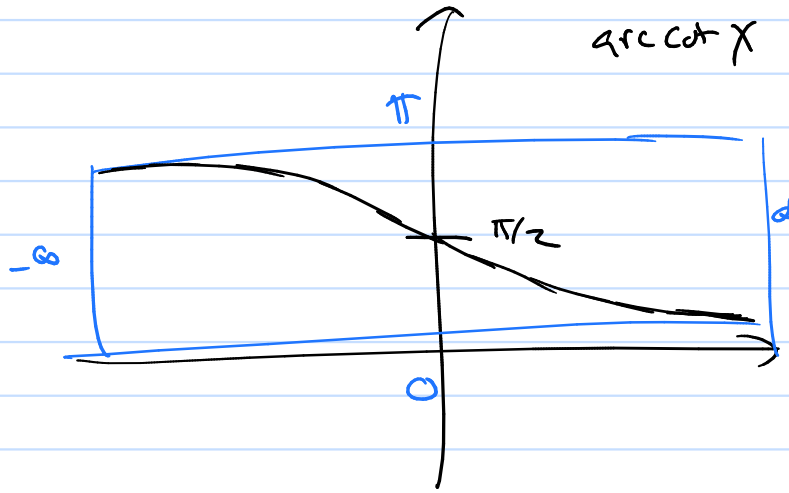
$\tan(\arctan x) = x$ all reals

$\arctan(\tan x) = x \quad -\pi/2 < x < \pi/2$



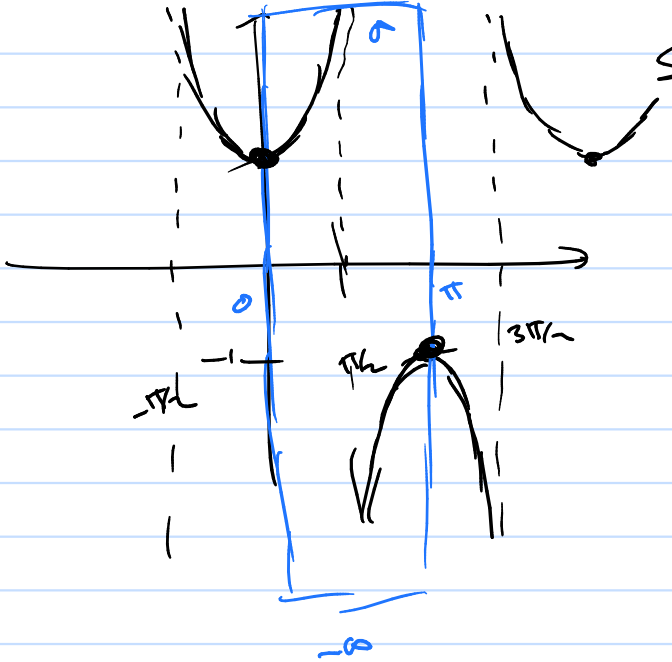
D: $(0, \pi)$

R: $(-\infty, \infty)$



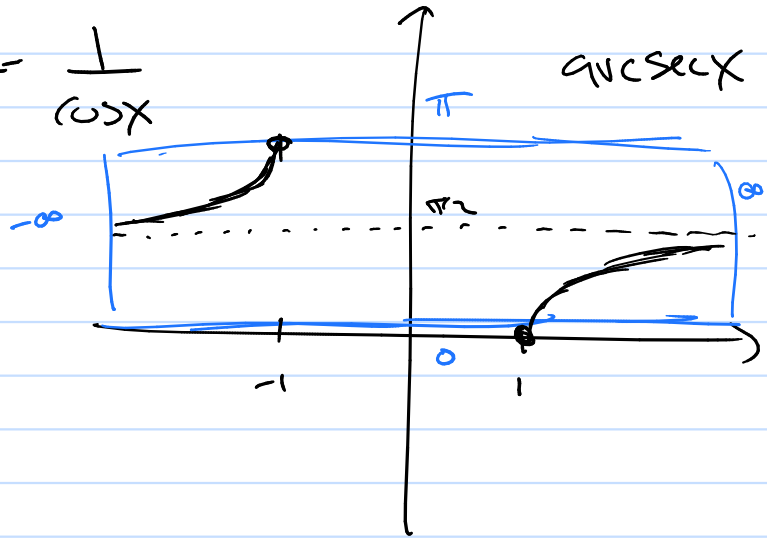
D: $(-\infty, \infty)$

R: $(0, \pi)$



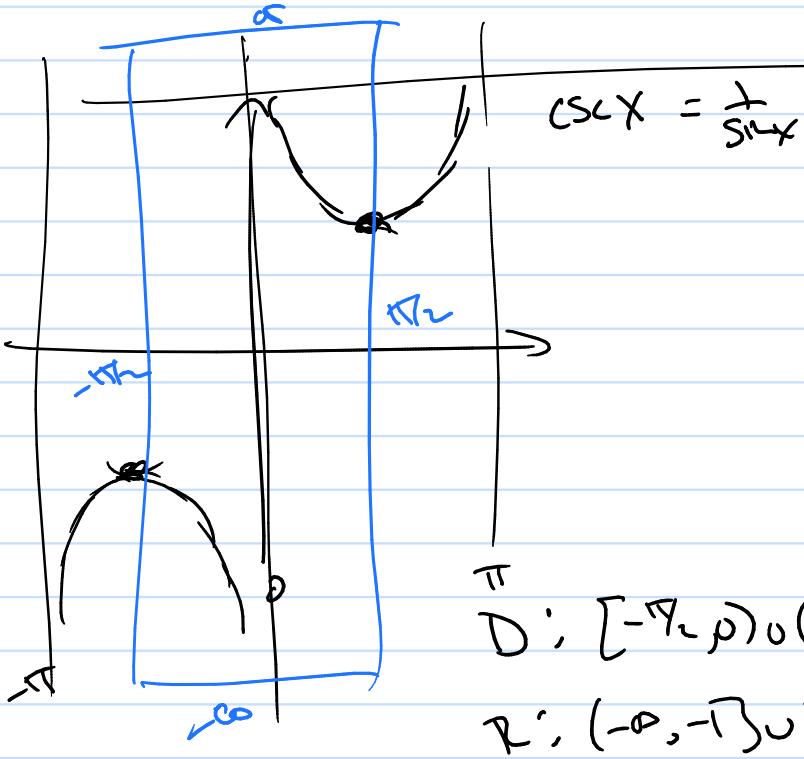
$D: [0, \pi/2) \cup (\pi/2, \pi]$

$R: (-\infty, -1] \cup [1, \infty)$



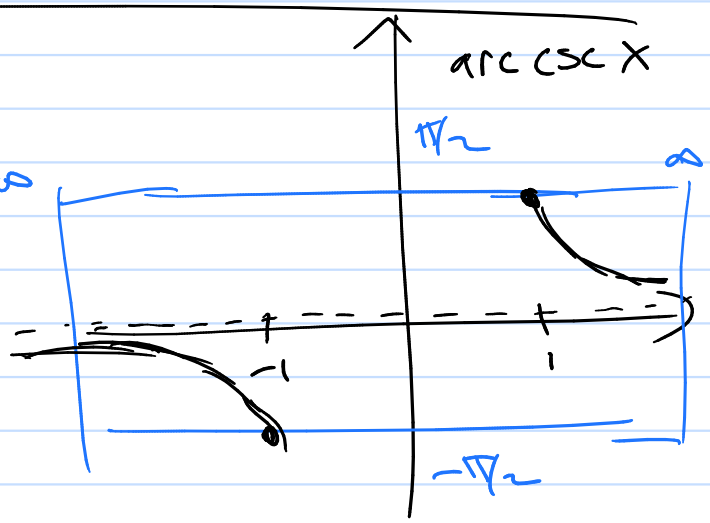
$D: (-\infty, -1] \cup [1, \infty)$

$R: [0, \pi/2) \cup (\pi/2, \pi]$



$D: [-\pi/2, 0) \cup (0, \pi/2]$

$R: (-\infty, -1] \cup [1, \infty)$

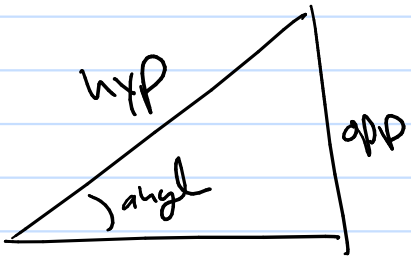


$D: (-\infty, -1] \cup [1, \infty)$

$R: [-\pi/2, 0) \cup (0, \pi/2]$

Evaluations:

Know the following



$\sin(\text{angle}) = \frac{\text{opp}}{\text{hyp}}$ $\quad \arcsin\left(\frac{\text{opp}}{\text{hyp}}\right) = \text{angle}$

$\cos(\text{angle}) = \frac{\text{adj}}{\text{hyp}}$ $\quad \arccos\left(\frac{\text{adj}}{\text{hyp}}\right) = \text{angle}$

$\tan(\text{angle}) = \frac{\text{opp}}{\text{adj}}$ $\quad \arctan\left(\frac{\text{opp}}{\text{adj}}\right) = \text{angle}$

$\sec(\text{angle}) = \frac{\text{hyp}}{\text{adj}}$ $\quad \text{arcsec}\left(\frac{\text{hyp}}{\text{adj}}\right) = \text{angle}$

$\csc(\text{angle}) = \frac{\text{hyp}}{\text{opp}}$ $\quad \text{arccsc}\left(\frac{\text{hyp}}{\text{opp}}\right) = \text{angle}$

$\cot(\text{angle}) = \frac{\text{adj}}{\text{opp}}$ $\quad \text{arccot}\left(\frac{\text{adj}}{\text{opp}}\right) = \text{angle}$

$$\cos\left(\arctan\left(\tfrac{1}{3}\right)\right) = \frac{3}{\sqrt{10}} = \frac{3}{10}\sqrt{10}$$