122 §1.7 ~~#s~~ 1-7, 8, 11-17, 21-24, 35-38, 41, 42, 43-65, 66, 67-73,

ALL

77, 79, 83, 84, 85, 97-100 ALL, 103, 106

115

You guys, in class.
Explain it to me
All points or no points.

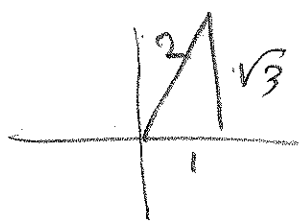
§1.7 #s 1–7, 8, 11–

	Func.	Alternate	Domain	Range
①	$y = \arcsin(x)$	$\sin^{-1}(x)$	$[-1, 1]$	$[-\frac{\pi}{2}, \frac{\pi}{2}]$
②	$y = \arccos(x)$	$\cos^{-1}(x)$	$[-1, 1]$	$[0, \pi]$
③	$y = \arctan(x)$	$\tan^{-1}(x)$	$(-\infty, \infty)$	$(-\frac{\pi}{2}, \frac{\pi}{2})$

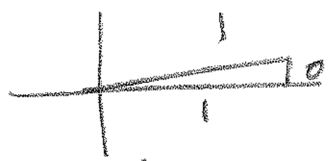
④ Without (short of) restricting the domain, NO trig function has an inverse that is also a function.

#s 5–18 Evaluate w/o a calculator

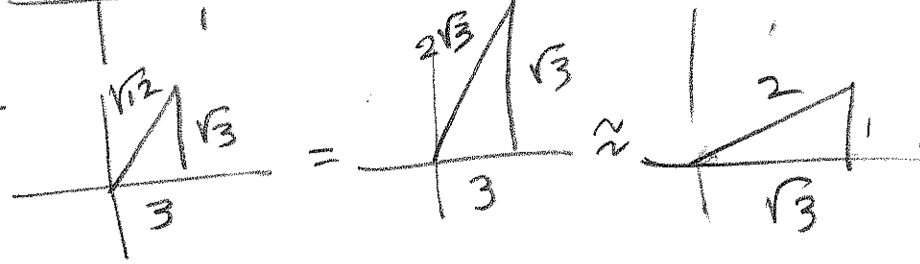
⑤ $\arccos(\frac{1}{2}) = \frac{\pi}{3}$ OR 60°



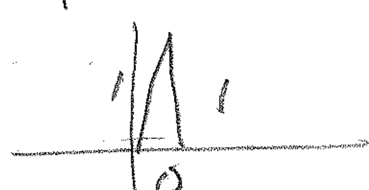
⑥ $\arcsin(0) = 0$



⑨ $\arctan(\frac{\sqrt{3}}{3}) = \frac{\pi}{6}$ OR 30°



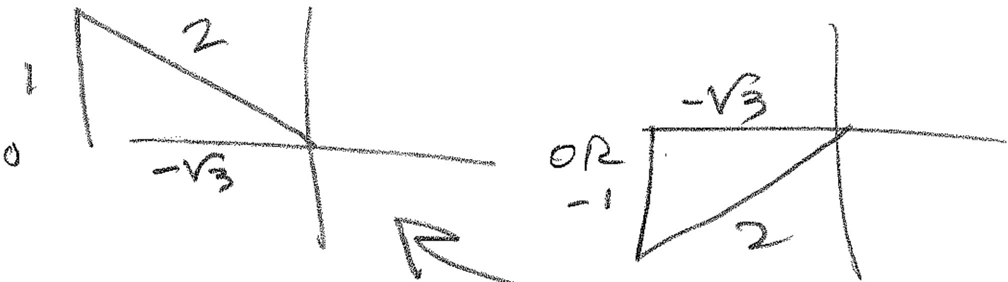
⑧ $\arccos(0) = \frac{\pi}{2}$ OR 90°



⑩ $\arctan(1) = \frac{\pi}{4}$ OR 45°

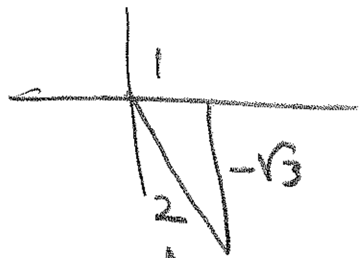
122 §1.7

(11) $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$
$= \frac{5\pi}{6}$ OR $150°$

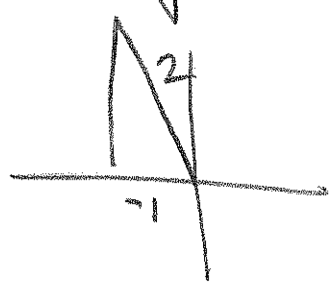


but $\cos^{-1}(x)$ only sees this one

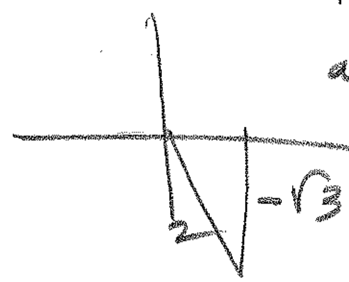
(13) $\arctan(-\sqrt{3})$
$= -\frac{\pi}{3}$ OR $-60°$



(15) $\arccos\left(-\frac{1}{2}\right)$
$= \frac{2\pi}{3}$ OR $120°$



(17) $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right) = -\frac{\pi}{3}$
OR $-60°$



These are the UNIQUE pictures for the problem situations. BUT be mindful that there are always 2 pictures for $\sin x = -\frac{\sqrt{3}}{2}$

and $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ only sees one.

#20 See class notes

#s 21–38 Eval w/ a calculator. Round to 2 places ~~[illegible]~~.

(21) $\arccos(0.37) \approx 1.191787306$
$\approx \boxed{1.19}$

122 § 1.7 #s

22 $\arcsin(.65) \approx .7075844367 \approx \boxed{.71}$

25 $\arctan(-3) \approx -1.249045772 \approx \boxed{-1.25}$

27 $\sin^{-1}(0.31) \approx .3151930324 \approx \boxed{.32}$

23 $\arcsin(-.75) \approx \boxed{-.85}$

24 $\arccos(-.7) \approx \boxed{2.35}$

35 $\tan^{-1}\left(\frac{19}{4}\right) \approx \boxed{1.36}$

36 $\tan^{-1}\left(-\frac{95}{7}\right) \approx \boxed{1.50}$

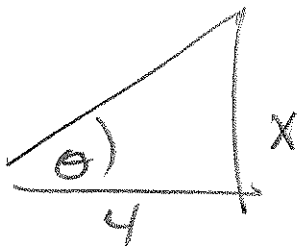
37 $\tan^{-1}\left(-\sqrt{372}\right) \approx \boxed{-1.52}$

38 $\tan^{-1}\left(-\sqrt{2165}\right) \approx \boxed{-1.55}$

122 §1.7

#s 41-46 write θ as a function of x

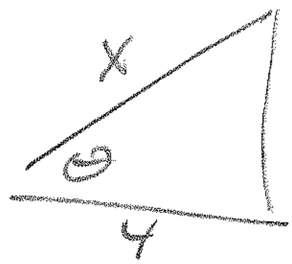
41



$\frac{x}{4} = \tan\theta$, i.e.,

$$\boxed{\theta = \arctan\left(\frac{x}{4}\right)}$$

42

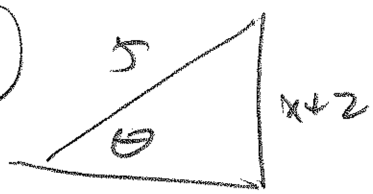


$\frac{4}{x} = \cos\theta$, i.e.,

$$\boxed{\theta = \arccos\left(\frac{x}{4}\right)}$$

you could also do $\theta = \operatorname{arcsec}\left(\frac{4}{x}\right)$, if you wanted.

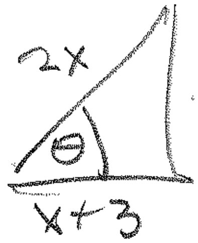
43



$$\boxed{\theta = \arcsin\left(\frac{x+2}{5}\right)}$$, since

$\frac{x+2}{5} = \sin\theta$

45



$$\boxed{\theta = \arccos\left(\frac{x+3}{2x}\right)}$$

122 §1.7 ~~#5~~

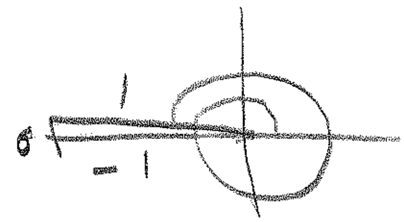
#s 47-52 Evaluate the expression

47 $\sin(\arcsin(0.3)) = 0.3$!

48 $\tan(\arctan(45)) = 45$!

49 $\cos(\arccos(-0.1)) = -0.1$

51 $\arcsin(\sin(3\pi))$



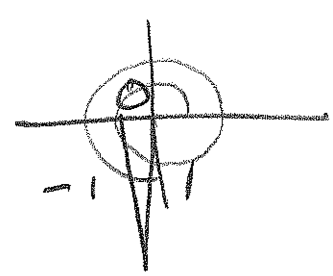
$= \arcsin(0)$

$\boxed{= 0}$!

Arcsine sees NOTHING outside $-\frac{\pi}{2}$ to $\frac{\pi}{2}$, so $\sin(x) = 0$ means $x = 0$, according to arcsine!

Arcsine is <u>only</u> a function if sine is restricted to $x \in [-\frac{\pi}{2}, \frac{\pi}{2}]$ ...

52 $\arccos(\cos(\frac{7\pi}{2}))$



$= \arccos(0)$

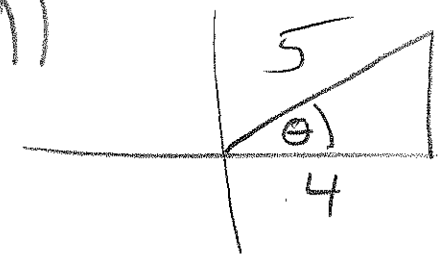
$\boxed{= \frac{\pi}{2}}$!

122 §1.7 #s

#s 53–64 Find the exact value

53 $\sin\left(\arctan\left(\frac{3}{4}\right)\right)$

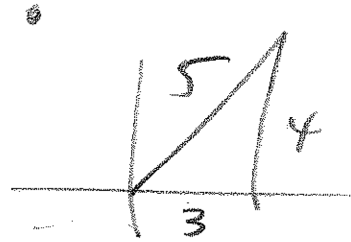
$= \boxed{\frac{3}{5}}$



$\arctan\left(\frac{3}{4}\right)$ gave the pic, and the pic gave us the sine.

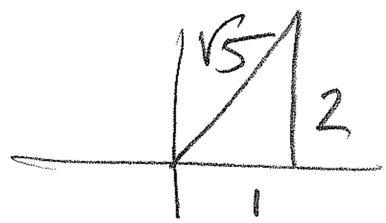
54 $\sec\left(\arcsin\left(\frac{4}{5}\right)\right)$

$= \boxed{\frac{5}{3}}$



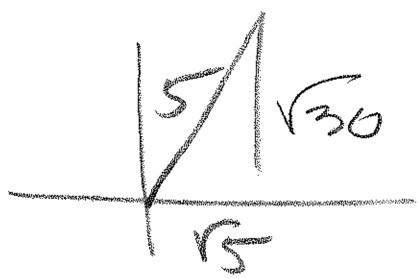
55 $\cos\left(\tan^{-1}(2)\right)$

$= \boxed{\frac{1}{\sqrt{5}}}$



56 $\sin\left(\cos^{-1}\left(\frac{\sqrt{5}}{5}\right)\right)$

$= \boxed{\frac{\sqrt{30}}{5}}$

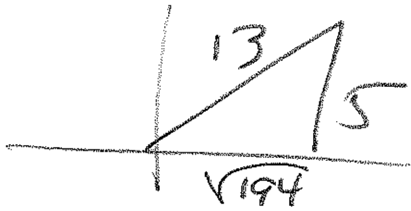


$\sqrt{25+5} = \sqrt{30}$
$= \sqrt{2 \cdot 3 \cdot 5}$

122 §1.7 #s

(57) $\cos\left(\arcsin\left(\frac{5}{13}\right)\right)$

$= \boxed{\frac{\sqrt{194}}{13}}$

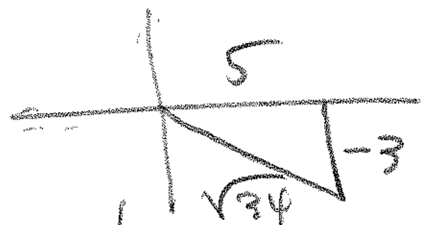


$25 + 169 = 194$

$2\,\underline{|\,194}$
$\quad 97$

(59) $\sec\left(\arctan\left(-\frac{3}{5}\right)\right)$

$= \boxed{\frac{\sqrt{34}}{5}}$



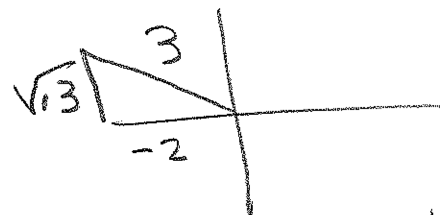
How did I **KNOW** it wasn't

THIS picture:

?

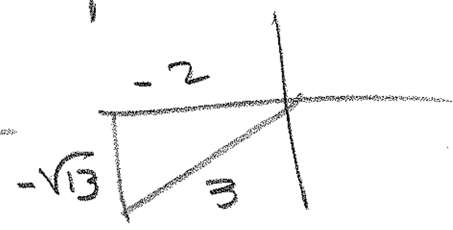
Answer: **2 BONUS**

(61) $\sin\left(\arccos\left(-\frac{2}{3}\right)\right)$



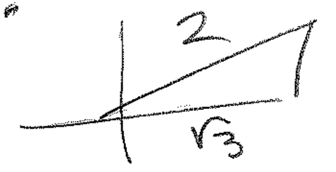
$= \boxed{\frac{\sqrt{13}}{3}}$

How'd I Know it wasn't



so the answer wasn't $-\frac{\sqrt{13}}{3}$?

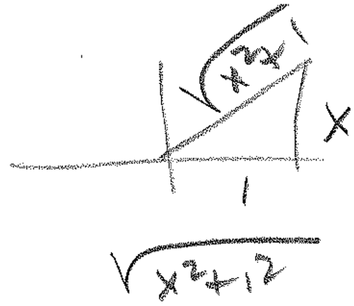
(63) $\csc\left(\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)\right) = \boxed{2}$



#s 65-74 Write an algebraic expression that's equivalent to the one given.

THESE COME UP BIG IN CALCULUS!

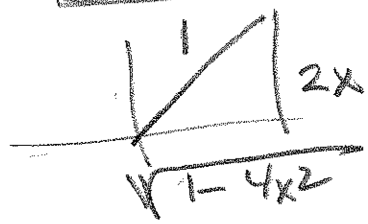
122 §1.7 #s



65 $\cot(\arctan(x))$

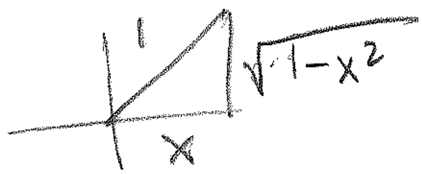
$= \boxed{\frac{1}{x}}$

66 $\sin(\arctan(x)) = \boxed{\frac{x}{\sqrt{x^2+1}}}$ Same pic.



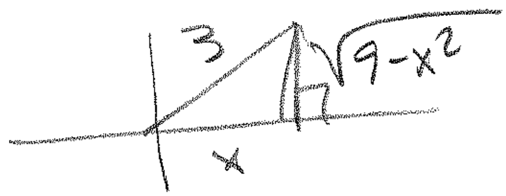
67 $\cos(\arcsin(2x))$

$= \boxed{\sqrt{1-4x^2}}$



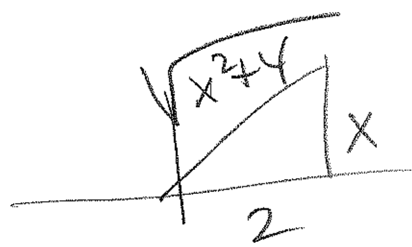
69 $\sin(\arccos(x))$

$= \boxed{\sqrt{1-x^2}}$



71 $\tan(\arccos(\frac{x}{3}))$

$= \boxed{\frac{\sqrt{9-x^2}}{x}}$



73 $\cos(\arctan(\frac{x}{\sqrt{2}}))$

$= \boxed{\frac{2}{\sqrt{x^2+4}}}$ and even the book wastes no time rationalizing this sucker!

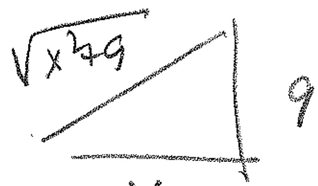
Read #s 75, 76 to see how those* the same graphs.

* actually all have ~~#s~~ 65–74 did

122 §1.7 #s

#s 77 – 80 complete the eq'n.
This is sort of a repeat of #s 65–76.
Same skill (limited application)

77 $\arctan\left(\frac{9}{x}\right) = \arcsin(\underline{\qquad})$, $x > 0$



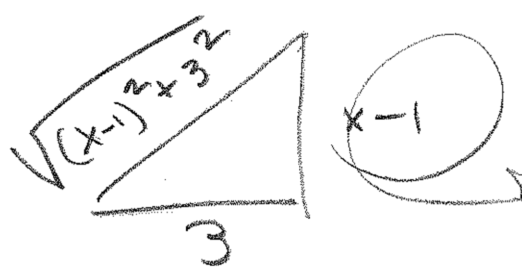
$= \arcsin\left(\frac{9}{\sqrt{x^2+9}}\right)$

Never seen those types, before, but just different exercises for the same skill.

79 oooh! Complete the square! ?

$$\arccos\left(\frac{3}{\sqrt{x^2-2x+10}}\right) = \arcsin\left(\frac{x-1}{\sqrt{x^2-2x+10}}\right)$$

$x^2-2x+10 = x^2-2x+1-1+10 = (x-1)^2+9$

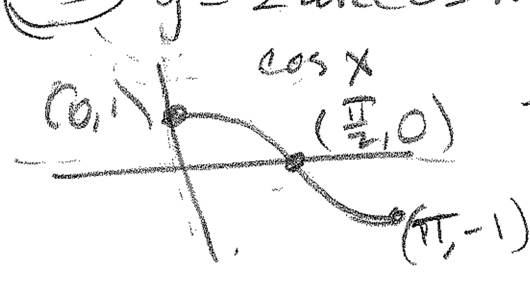


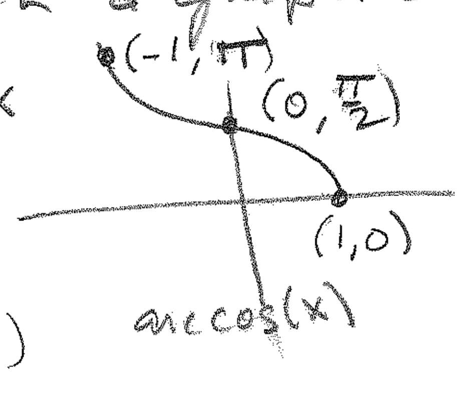
ANS:

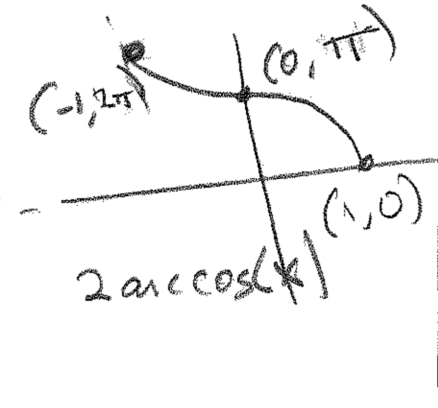
The part we had to find.

#s 83–88 Sketch a graph of function

83 $y = 2\arccos x$

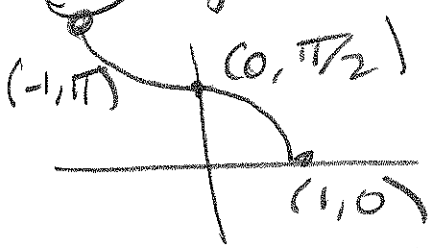




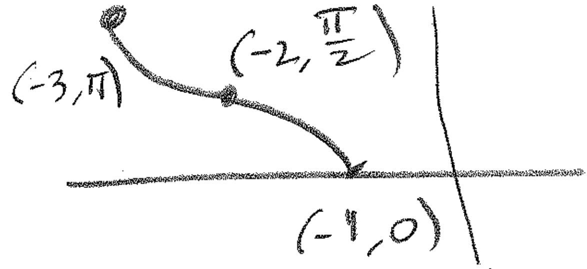


122 §1.7 #s

84 $g(t) = \arccos(t+2)$

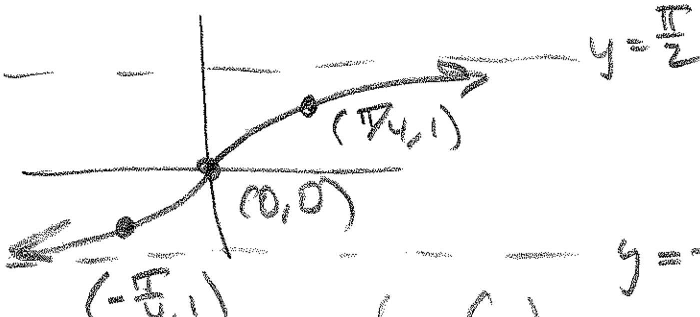


$\arccos(t)$

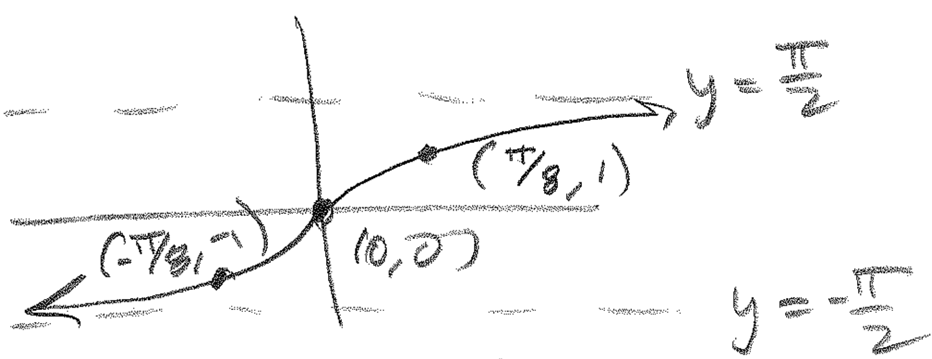


$\arccos(t+2)$

85 $\arctan(2x) = f(x)$



$\arctan(x)$



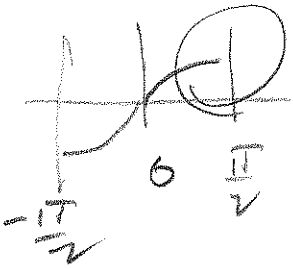
$\arctan(2x)$

122 §1.7 #5

#s 97 – 102 Fill in blank, if possible. If not possible, explain why

(97) As $x \to 1^-$, $\arcsin x \to \frac{\pi}{2}$

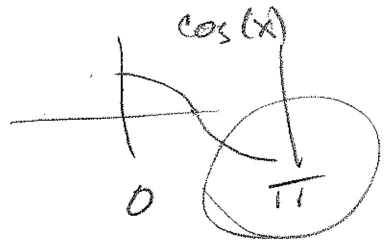
Easier for me to see by analyzing graph of sine, in reverse...



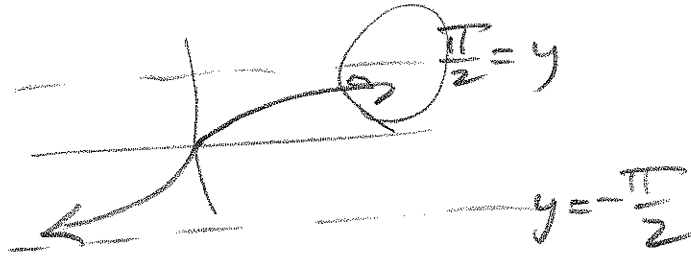
sin x i.e.,

$$\lim_{x \to 1^-} \arcsin(x) = \frac{\pi}{2}$$

(98) $\lim_{x \to -1^+} \arccos(x) = \pi$

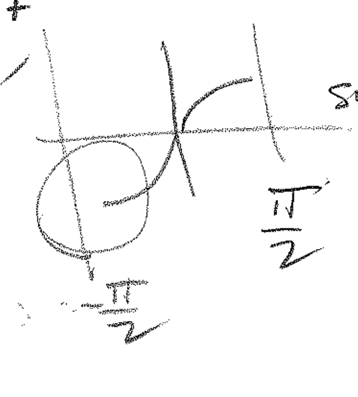


(99) $\lim_{x \to \infty} \arctan x = \frac{\pi}{2}$



Graph of arctangent is easier for me.

(100) $\lim_{x \to -1^+} \arcsin(x) = -\frac{\pi}{2}$



sin x graph looking @ y-values approaching –1 and seeing what x-values are.