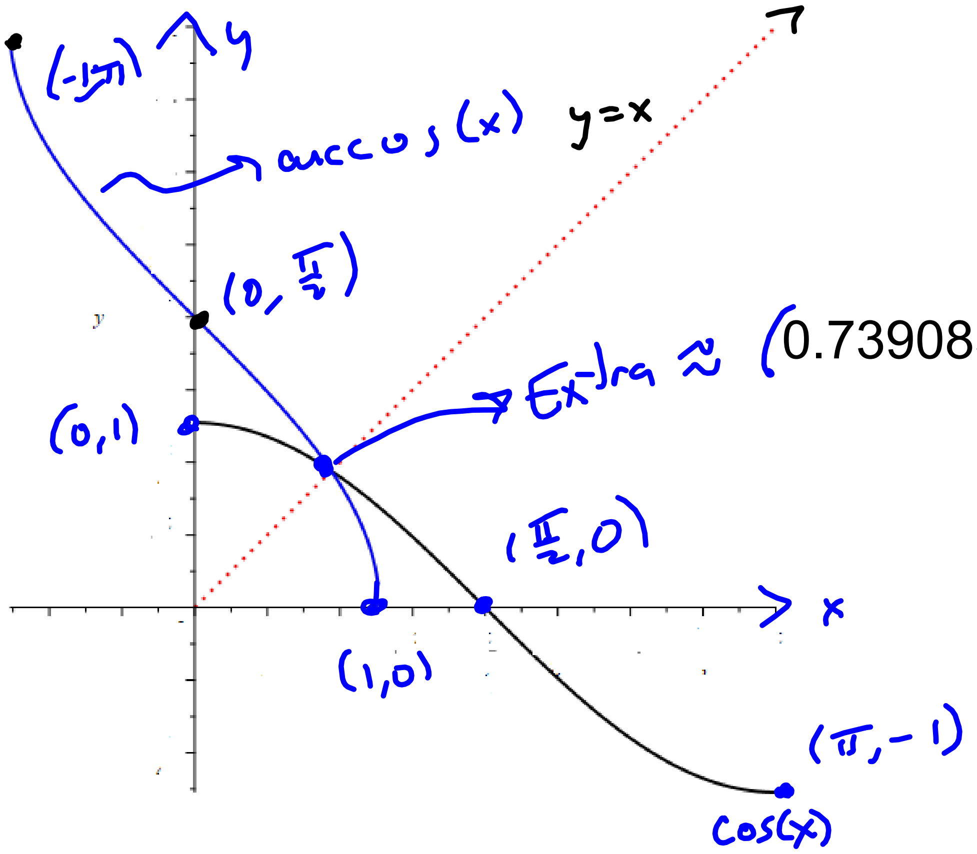
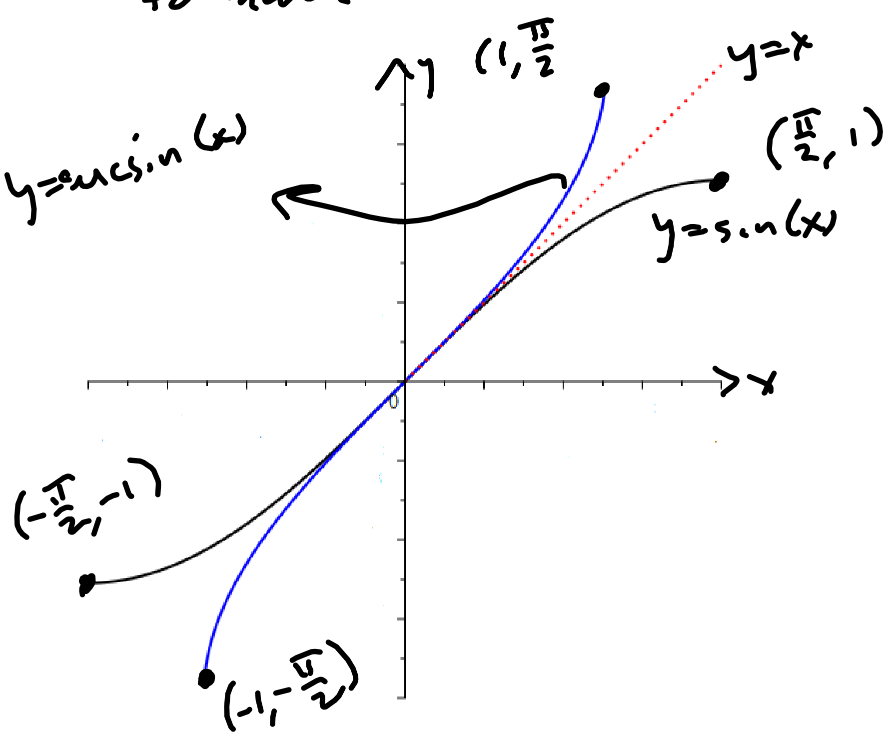
1420 WEEK 4 SOL'NS H. MILLS

① We sketch the graphs of...

② (5 pts) $y=\cos(x)$ with the standard restriction to make it 1-to-1 and $\arccos(x)=y$



⑥ (5 pts) $y=\sin(x)$ with the standard restriction to make it 1-to-1 and $\arcsin(x)=y$



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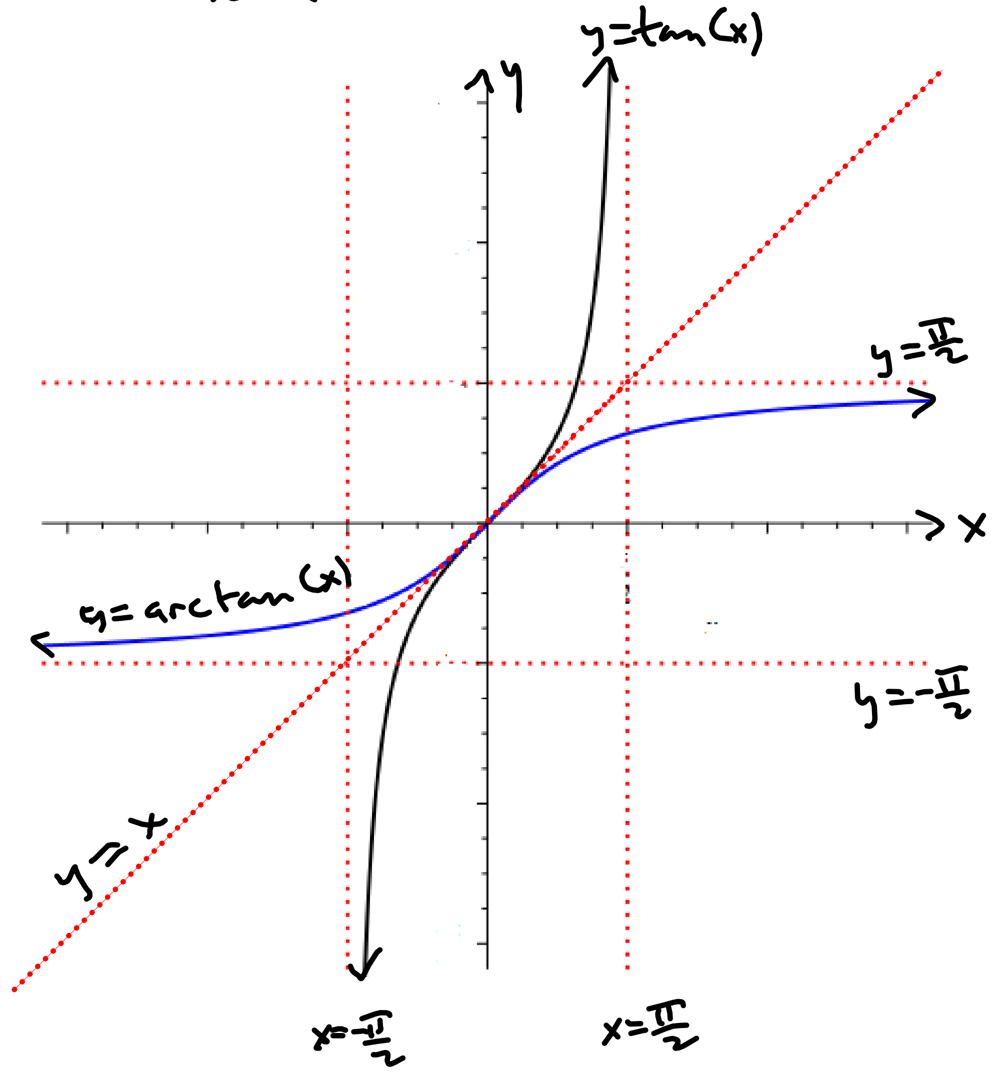
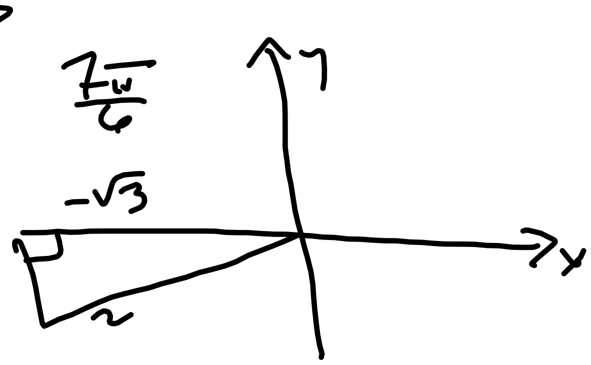
(c) (5pts) $y = \tan(x)$ with the standard restriction to make it 1-to-1 and $\arctan(x) = y$

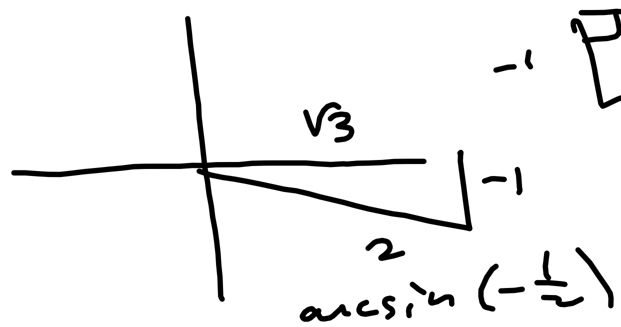


(2) We find the exact value of the following

(a) (5pts) $\arcsin\left(\sin\left(\frac{7\pi}{6}\right)\right) = \arcsin\left(-\frac{1}{2}\right)$

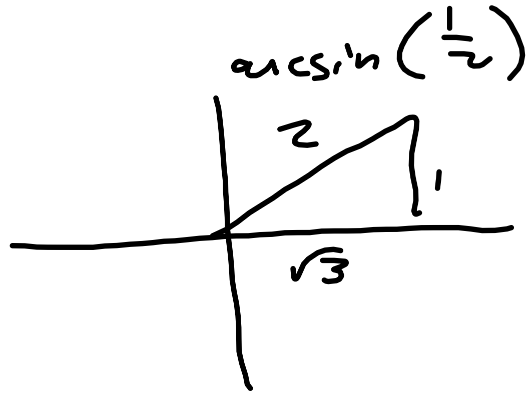
$= \boxed{-\frac{\pi}{6}}$





(b) (5pts) $\sec\left(\arcsin\left(\frac{1}{2}\right)\right) = \sec\left(\frac{\pi}{6}\right)$

$= \frac{1}{\cos\left(\frac{\pi}{6}\right)} = \frac{1}{\frac{\sqrt{3}}{2}} = \boxed{\frac{2}{\sqrt{3}}}$



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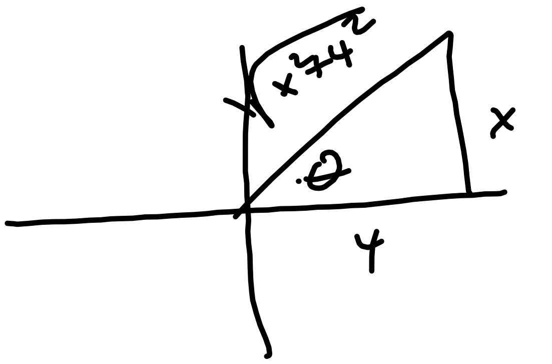
(3) We draw the picture in QI and write an equivalent expression.

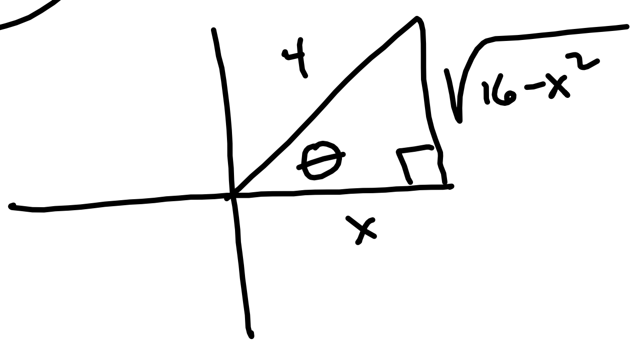
(a) 5pts

$$\cos\left(\arctan\left(\frac{x}{4}\right)\right) = \cos\theta = \frac{4}{\sqrt{x^2+16}}$$



(b) 5pts

$$\tan\left(\arccos\left(\frac{x}{4}\right)\right) = \tan\theta = \frac{\sqrt{16-x^2}}{x}$$



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4 5pts

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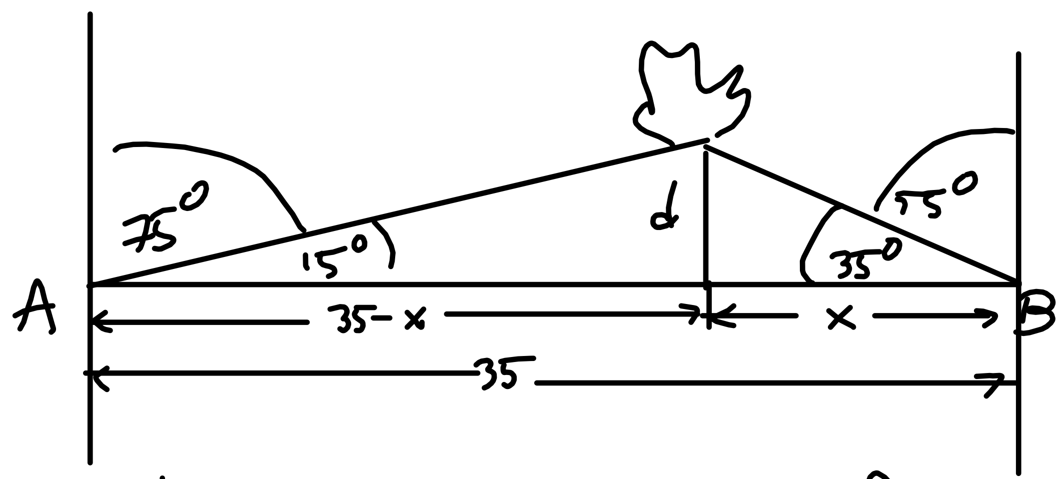
Fire tower *A* is 35 miles due west of fire tower *B*. A fire is spotted from the towers, and the bearings from *A* and *B* are $\theta = 75^\circ$ & $\phi = 55^\circ$, respectively

We find the distance *d* of the fire from the line segment *AB*.



Let d = distance from $\overline{AB}$ to the fire, in miles.

Let x be as shown in the diagram, also in miles.

Then $\frac{d}{35-x} = \tan 15^\circ$ & $\frac{d}{x} = \tan 35^\circ$

$\Rightarrow (35-x)\tan 15^\circ = d = x \tan 35^\circ \Rightarrow$

$(35-x)\,a = x \cdot b$, where $a = \tan 15^\circ$, $b = \tan 35^\circ \Rightarrow$

$35a - ax = bx \Rightarrow$

$-ax - bx = -35a \Rightarrow$

$ax + bx = (a+b)\,x = 35a$

$\Rightarrow x = \frac{35a}{a+b} = \frac{35 \tan 15^\circ}{\tan 15^\circ + \tan 35^\circ} \approx 9.68667720657 \approx x$

$\Rightarrow d = x \tan 35^\circ \approx 9.68667720657 \tan 35^\circ \approx$

$\approx \boxed{6.78268440024 \text{ mi} \approx d}$