Test 2 - Wednesday

Homework due: §3.7 Rational functions

§4.1 Exp functions; compound interest

4.2 e^x; continuous compounding

4.3 Log functions

4.4 Laws of logs

4.5 Exp and Log equations

4.6 Modeling with Exp and Log (word problems)

Chap 5 Test: 1-9 - Definitions of the trig functions

Chap 6 Test: 1-11 - Solving right triangles

5.3 Graphs of sine and cosine

For potential Rational Function problems see Quiz 4 and homework.

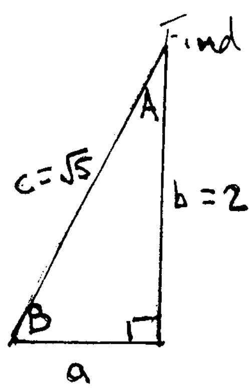
" " Exp and Log " see Quiz 5 " "

Trig problems

Chap 6 - Solving Right triangles

ex. In a right triangle one leg has length $2 = b$ and hypotenuse $\sqrt{5} = c$

Find the remaining side, and the remaining angles.



$$a^2 = c^2 - b^2 = \sqrt{5}^2 - 2^2 = 5 - 4 = 1 \Rightarrow a = \boxed{1}$$

$$\sin B = \frac{\text{opp}}{\text{hyp}} = \frac{b}{c} = \frac{2}{\sqrt{5}} \Rightarrow B = \sin^{-1}\left(\frac{2}{\sqrt{5}}\right) = \boxed{63.4^\circ}$$

$$A = 90^\circ - 63.4^\circ = \boxed{26.6^\circ}$$

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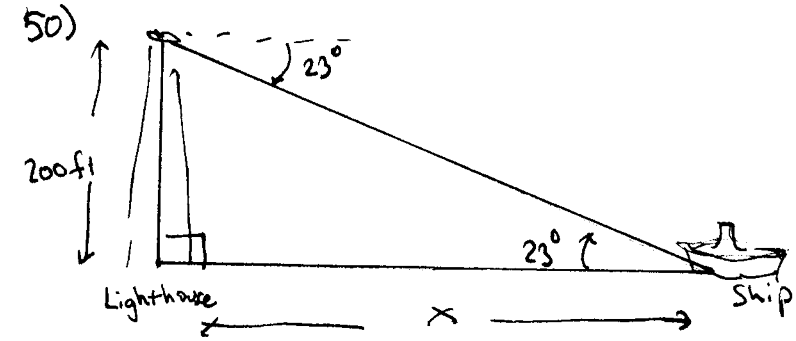
50)



$$\tan 23^\circ = \frac{\text{opp}}{\text{adj}} = \frac{200\text{ ft}}{x} \Rightarrow x = \frac{200\text{ ft}}{\tan 23^\circ} = \frac{200\text{ ft}}{0.42447}$$

$$= 471 \text{ feet}$$

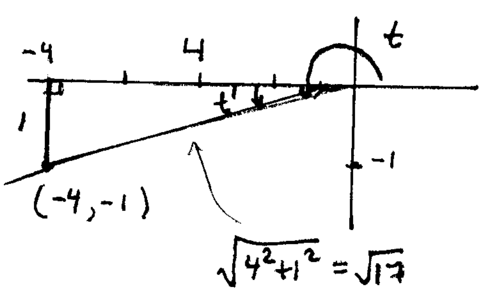
5.2

p385 68) $\tan t = \frac{1}{4}$, t is in Quadrant III. Find the other five trig functions

In Quadrant III, $\sin t < 0$

$\cos t < 0$

$\tan t > 0$



$\sin t' = \frac{\text{opp}}{\text{hyp}} = \frac{1}{\sqrt{17}}$ so $\sin t = -\frac{1}{\sqrt{17}}$

$\cos t' = \frac{\text{adj}}{\text{hyp}} = \frac{4}{\sqrt{17}}$ so $\cos t = -\frac{4}{\sqrt{17}}$

Let t' = "reference angle"

= angle which the terminal ray makes with the nearest half of the x-axis

$\tan t = \frac{1}{4}$

$\csc t = -\sqrt{17}$

$\sec t = -\frac{\sqrt{17}}{4}$

$\cot t = 4$

Idea: $\sin t = \pm \sin t'$

$\cos t = \pm \cos t'$

$\tan t = \pm \tan t'$

choose '+' or '−' depending on

S	A
T	C

$y = a\sin b(x-c)+d$ OR $y = a\cos b(x-c)+d$ M141 3/23/15

Graphs of trig functions (especially sine and cosine) see §5.3

examples: [Eqn → Graph]

example	amplitude	period	phase shift	vertical shift	range
30) $y=2\sin\left(x-\frac{\pi}{3}\right)$	2	2π	$\pi/3$	0	$[-2,2]$
32) $y=3\cos\left(x+\frac{\pi}{4}\right)$	3	2π	$-\frac{\pi}{4}$	0	$[-3,3]$
34) $y=\sin\frac{1}{2}\left(x+\frac{\pi}{4}\right)$	1	$\frac{2\pi}{1/2}=2\pi\cdot 2$, $\frac{2\pi}{b}=4\pi$	$-\frac{\pi}{4}$	0	$[-1,1]$
36) $y=2\sin\left(\frac{2}{3}x-\frac{\pi}{6}\right)$	2	$2\pi\div\frac{2}{3}=2\pi\cdot\frac{3}{2}=3\pi$	Solve: $\frac{2}{3}x-\frac{\pi}{6}=0$, $\frac{2}{3}x=\frac{\pi}{6}$, $x=\frac{3}{2}\cdot\frac{\pi}{6}=\frac{\pi}{4}$	0	$[-2,2]$
38) $y=1+\cos\left(3x+\frac{\pi}{2}\right)$	1	$\frac{2\pi}{3}$	Solve $3x+\frac{\pi}{2}=0$, $x=-\frac{\pi}{6}$	1	$[0,2]$
37) $y=\frac{1}{2}-\frac{1}{2}\cos\left(2x-\frac{\pi}{3}\right)$	$\frac{1}{2}$	π	$\frac{\pi}{6}$	$\frac{1}{2}$	$[0,1]$

30) So $a=2$, $b=1$, $c=\pi/3$, $d=0$

36) in standard form

$$y=2\sin\frac{2}{3}\left(x-\frac{\pi}{4}\right)$$

$a=2$, $b=2/3$, $c=\pi/4$, $d=0$

38) Std. form:

$$y=\cos 3\left(x+\frac{\pi}{6}\right)+1$$

$a=1$, $b=3$, $c=-\pi/6$, $d=1$

37) or

$$y=-\frac{1}{2}\cos 2\left(x-\frac{\pi}{6}\right)+\frac{1}{2}$$

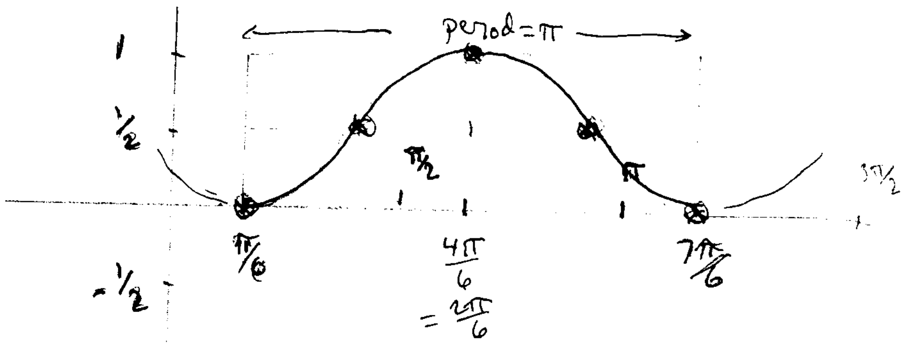
$a=-\frac{1}{2}$, $b=2$, $c=\pi/6$, $d=\frac{1}{2}$

amplitude $=|a|=|-\frac{1}{2}|=\frac{1}{2}$

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

phase shift $=c=\pi/6$

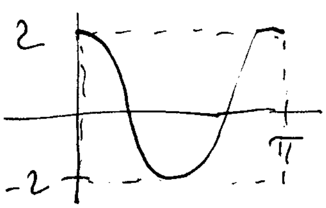
Graph of #37) $y = -\frac{1}{2}\cos 2\left(x - \frac{\pi}{6}\right) + \frac{1}{2}$



examples [graph → equation]

p 396 §5.3 44)

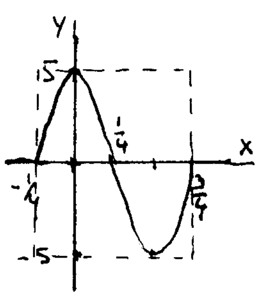
range $= [-2, 2]$
amplitude $= 2$ $\Rightarrow$ $a = 2$ or -2
period $= \pi$ $\quad b = \frac{2\pi}{\text{period}} = \frac{2\pi}{\pi} = 2$
phase shift $= 0$ $\quad c = 0$ Looks like cosine with a positive



$y = a\cos b(x-c) + d$ becomes (because $d = 0$)

$y = 2\cos 2x$

50) Find an equation of the form $y = a\cos b(x-c) + d$
or $y = a\sin b(x-c) + d$



Range $= [-5, 5]$ $\Rightarrow$ amplitude $= \frac{5-(-5)}{2} = 5$ $\Rightarrow$ $a = 5$ or -5

mean value (vertical shift) $= \frac{5+(-5)}{2} = 0$ $\Rightarrow$ $d = 0$

period $= \frac{3}{4} - \left(-\frac{1}{4}\right) = 1$ $\Rightarrow$ $b = \frac{2\pi}{\text{period}} = \frac{2\pi}{1} = 2\pi$

phase shift $= -\frac{1}{4}$ $\Rightarrow$ $c = -\frac{1}{4}$ [for the given choice of frame]

The shape of the graph within the frame looks like sine with a positive.

$\therefore$ The equation is $\boxed{y = 5\sin 2\pi\left(x - \frac{1}{4}\right)}$.