MA110. 12/5 - #42

Review -

Example ! If $\pi \le t \le \frac{3\pi}{2}$

$\sin(t) = -5/13$. Find

$\sec(t)$.

$\cos^2(t) + \sin^2(t) = 1$.

Since $(\cos(t), \sin(t))$

are on unit circle.

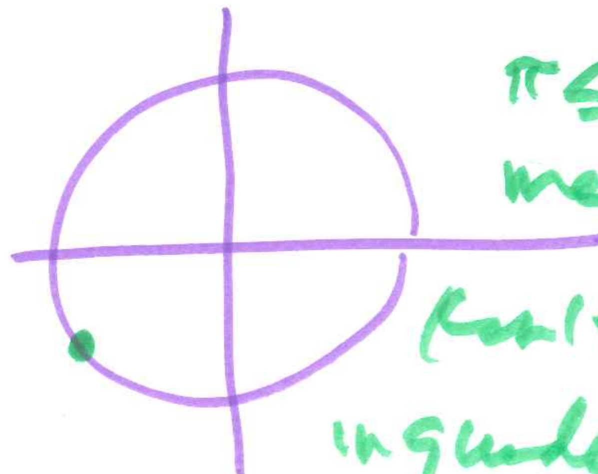
$\cos^2(t) + \left(\frac{-5}{13}\right)^2 = 1$.

$\cos^2(t) = 1 - \frac{25}{169}$

$= \frac{169-25}{169}$

$= \frac{144}{169}$.

$\cos(t) = \pm 12/13$.



$\pi \le t \le 3\pi/2$

means

$(\cos(t), \sin(t))$

in quadrant III.

$\cos(t) < 0$, $\sin(t) < 0$

Choose neg. sign $\cos(t) = -\frac{12}{13}$.

Since $\sec(t) = \frac{1}{\cos(t)}$

$\sec(t) = 1/(-12/13) = \frac{-13}{12}$.

Example 2

Find $\sin^{-1}(\sin(2\pi))$.

$= 0$

$t = \sin^{-1}(\sin(2\pi))$ is

the angle in $[-\frac{\pi}{2}, \frac{\pi}{2}]$

which satisfies

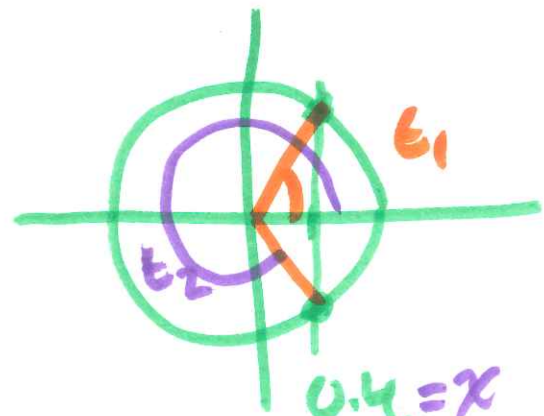
$\sin(t) = \sin(2\pi)$

$= 0$

or $t = 0$.

Example 3.

Find all solutions of $\cos(t) = 0.4$ in $[0, 2\pi]$.

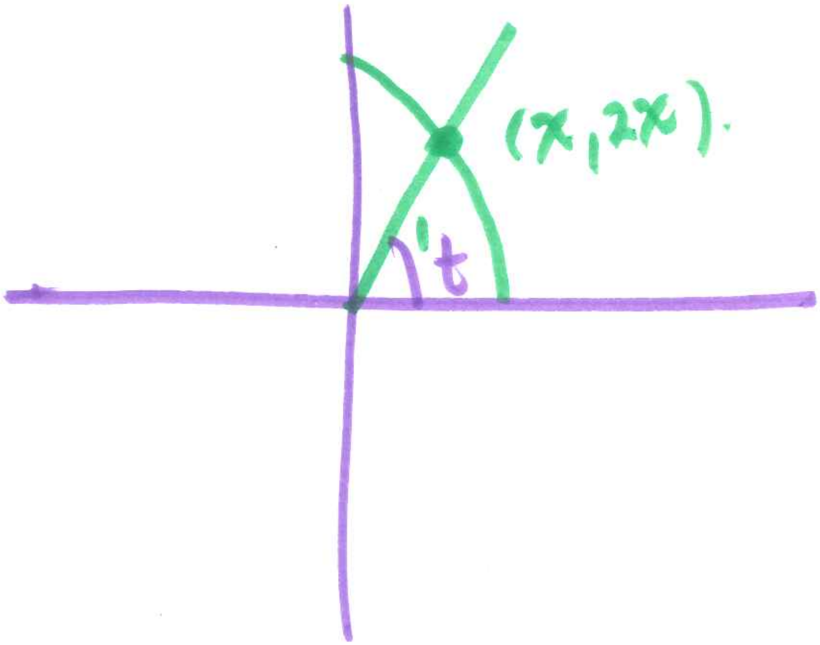


$t_1 = \cos^{-1}(0.4)$

≈ 1.159.

$t_2 = 2\pi - t_1 \approx 5.1239$.

Round 2 dec. places 1.16 and 5.12.



Find the angle between the ray $\{y=2x, x>0\}$ and the positive x-axis

$x^2+(2x)^2=1.$ $\quad x = 1/\sqrt{5}$

$5x^2=1$

$x^2 = 1/5$

$y = 2x = 2/\sqrt{5}.$

$\sin(t) = \dfrac{2}{\sqrt{5}} = \dfrac{2\sqrt{5}}{5}$

$\cos(t) = \dfrac{1}{\sqrt{5}} = \sqrt{5}/5$

$\tan(t) = y/x = \dfrac{2/\sqrt{5}}{1/\sqrt{5}} = 2$

$t = \sin^{-1}(2\sqrt{5}/5)$

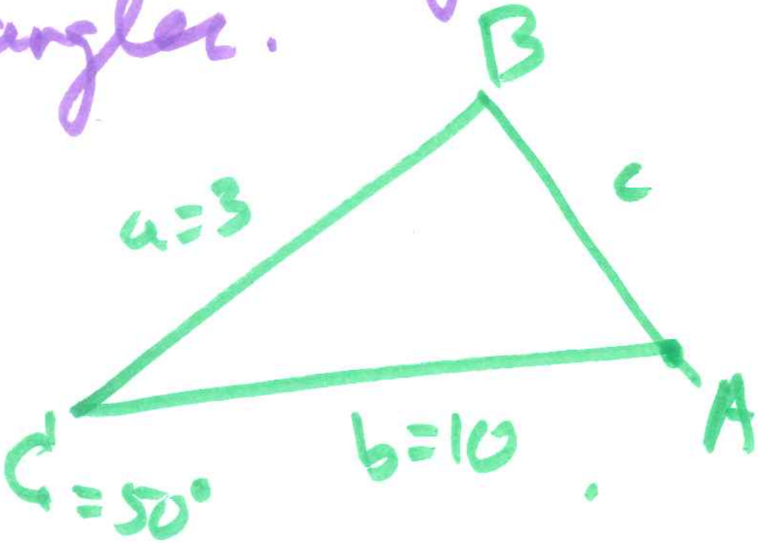
$t = \cos^{-1}(\sqrt{5}/5)$

$t = \tan^{-1}(2).$

For a triangle

$C = 50^\circ$, $a = 3$, $b = 10$

Find remaining sides & angles.



SAS - Use law of cosines to find 3rd side.

$$c^2 = a^2 + b^2 - 2ab\cos(C).$$

$$= 3^2 + 10^2 - 2\cdot 3\cdot 10\cdot \cos(50).$$

$$\approx 70.4327\ldots$$

$$c \approx 8.3924\ldots$$

Find A. Law of cosines again.

$$a^2 = b^2 + c^2 - 2bc\cos(A).$$

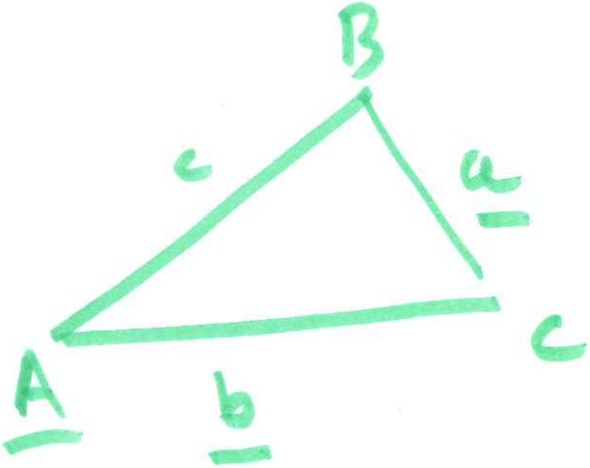
$$\cos(A) = \frac{c^2 + b^2 - a^2}{2bc}$$

$$A = \cos^{-1}(\quad)$$

$$\approx 15.8925^\circ$$

$B = 180 - (A+C)$

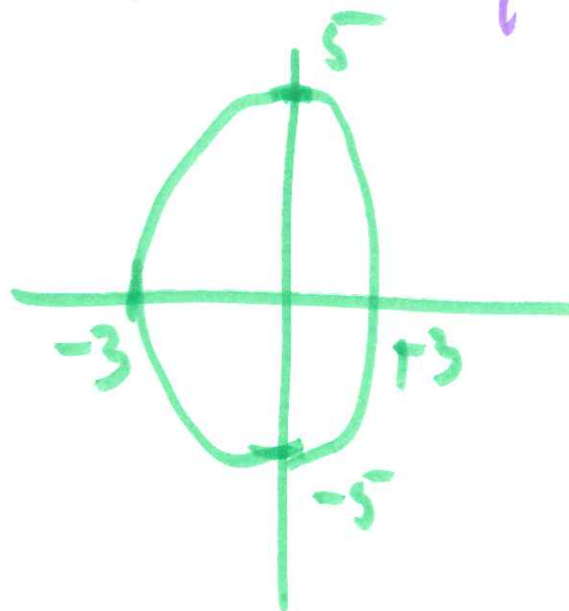
$\approx 134.1074.$



SSA. Use law of sines

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b}$$

The major axis ellipse is on the y-axis & of length 10. The minor axis is of length 6. Center (0,0) Find the equation —



Sketch ellipse given by

$$25x^2 + 50x + 9y^2 - 72y = 56$$

$$25(x^2 + 2x + 1)$$

$$+ 9(y^2 - 8y + 16) = 56$$

$+25$

$+\cancel{159}$ 144

$$25(x+1)^2 + 9(y-4)^2 = 225.$$

$$\frac{25(x+1)^2}{225} + \frac{9(y-4)^2}{225} = 1.$$

$$\frac{(x+1)^2}{9} + \frac{(y-4)^2}{25} = 1.$$

Equation is

$$\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1.$$

$$0 + \frac{5^2}{a^2} = 1$$

$a = 5$

$b = 3$

$$\frac{x^2}{9} + \frac{y^2}{25} = 1.$$

$$\frac{(x+1)^2}{9} + \frac{(y-4)^2}{25} = 1.$$

Ellipse $\frac{x^2}{9} + \frac{y^2}{25} = 1$

shifted 1 unit to the left & ~~4~~ 4 units up