Math 112

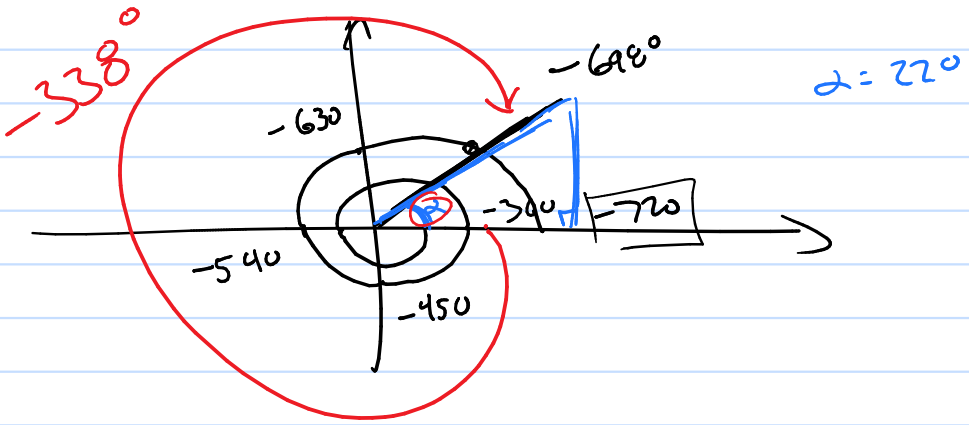
Q's 10.1

8 The positive angle between $0°$ and $360°$ that is coterminal with the angle $-698°$ is

22° degrees.

The negative angle between $-360°$ and $0°$ that is coterminal with the angle $-698°$ is

$-338°$ degrees.



$\alpha = 22°$

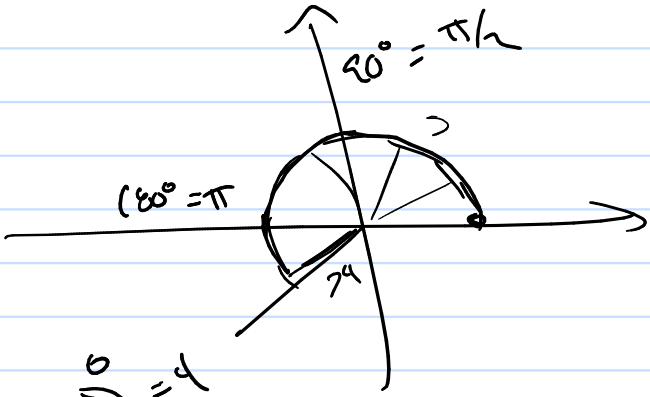
10.1

13 The length of the arc intercepted by a central angle of 4 radians in a circle of radius 74 is .

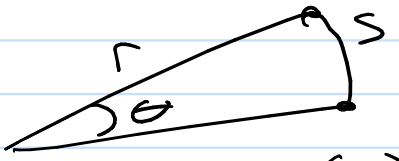
The length of the arc intercepted by a central angle of $20°$ in a circle of radius 20 is .

need radians

$20°\left(\frac{\pi}{180°}\right) = \frac{\pi}{9}$



$\left(4\left(\frac{180°}{\pi}\right)\right)^{\circ} = 4$



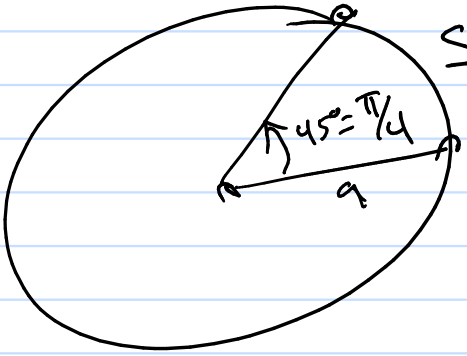
$s = (\theta)(r)$

↑ radians

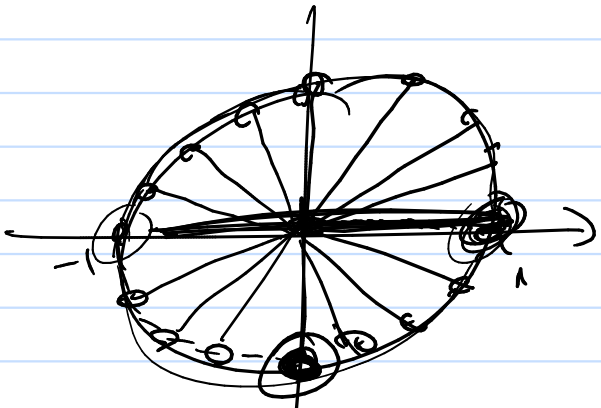
10.1

14 Find the length of an arc on a circle of radius 9 corresponding to an angle of 45°.

Arc length = $\frac{9\pi}{4}$ units. (Give an exact answer as a fraction, not a decimal approximation.)

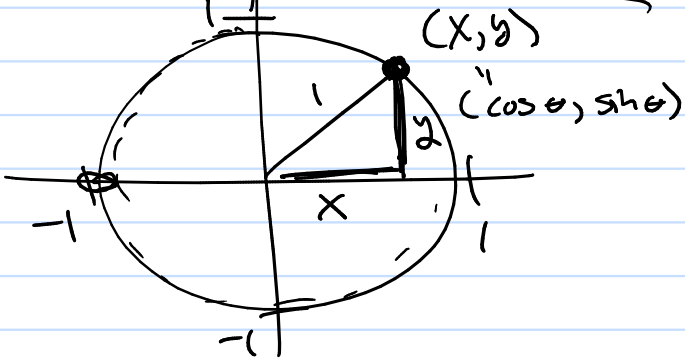


$S = \theta r$

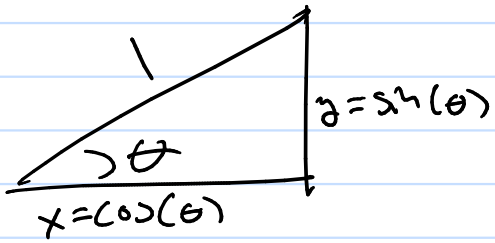


$\sin(\theta), \cos(\theta)$

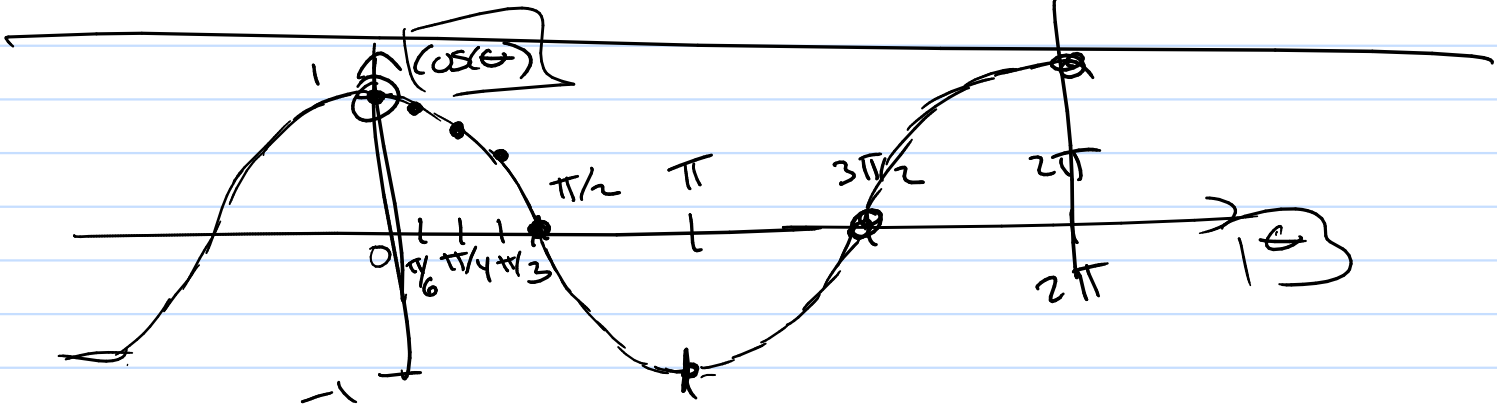
$x = \cos(\theta) \quad y = \sin(\theta)$



angle	$\cos(\theta)$	$\sin(\theta)$
0° or 0	1	0
30° or π/6	$\sqrt{3}/2$	1/2
45° or π/4	$\sqrt{2}/2$	$\sqrt{2}/2$
60° or π/3	1/2	$\sqrt{3}/2$
90° or π/2	0	1



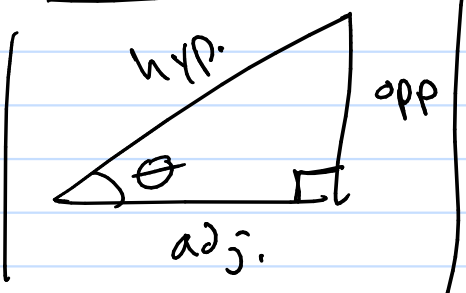
$\theta = 0$ gives $\cos(\theta) = \cos(0) = 1 \quad (0,1) \quad (\theta, \cos\theta)$



$\cos(\theta)$, $\sin(\theta)$ domain for θ $(-\infty, \infty)$

range $[-1, 1]$

In general



(*)

$\cos(\theta) = \frac{adj}{hyp}$ $\sin(\theta) = \frac{opp}{hyp}$

$\tan(\theta) = \frac{opp}{adj.}$ $\cot(\theta) = \frac{adj}{opp}$

$\sec(\theta) = \frac{hyp}{adj.}$ $\csc(\theta) = \frac{hyp}{opp}$

Identities (Equalities I MUST Know)

old ones?

- $a^2 - b^2 = (a-b)(a+b)$ ←
- $a^2 + 2ab + b^2 = (a+b)^2$
- $\log_b x = y$ means $x = b^y$
- etc

Reciprocal | Quotient Identities

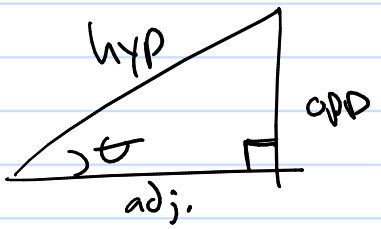
$\sec(\theta) = \frac{1}{\cos(\theta)}$ or $\cos(\theta) = \frac{1}{\sec(\theta)}$

$\csc(\theta) = \frac{1}{\sin(\theta)}$ or $\sin(\theta) = \frac{1}{\csc(\theta)}$

$\tan(\theta) = \frac{1}{\cot(\theta)}$ or $\cot(\theta) = \frac{1}{\tan(\theta)}$

$\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)}$

$\cot(\theta) = \frac{\cos(\theta)}{\sin(\theta)}$



pyth. th^m

$$\frac{adj^2}{opp^2} + \frac{opp^2}{opp^2} = \frac{hyp^2}{opp^2}$$

$$\left(\frac{adj}{hyp}\right)^2 + \left(\frac{opp}{hyp}\right)^2 = 1$$

So $(\cos(\theta))^2 + (\sin(\theta))^2 = 1$

or $\boxed{\cos^2\theta + \sin^2\theta \equiv 1}$

pyth. Identities

(v) $\boxed{1 + \tan^2\theta = \sec^2\theta}$

(vi) $\boxed{1 + \cot^2\theta = \csc^2\theta}$

---

play with them some

ex (v) $\cos^2\theta + \sin^2\theta = 1$

$\sin^2\theta = 1 - \cos^2\theta$

$\boxed{\sin^2\theta = (1 - \cos\theta)(1 + \cos\theta)}$

ex $1 + \tan^2\theta = \sec^2\theta$

$1 = \sec^2\theta - \tan^2\theta$

$\boxed{1 = (\sec\theta - \tan\theta)(\sec\theta + \tan\theta)}$