Part I: Problems **CALCULATOR FREE**

1. Simplify the following. [3 pts each]

   a) $\sin\frac{5\pi}{6}$

   e) $\sec\frac{\pi}{2}$

   b) $\cos\frac{-4\pi}{3}$

   f) $\cot\frac{-7\pi}{6}$

2. Find one positive and one negative coterminal angle, the reference angle, and convert to radians or degrees for each of the following angles. [5 pts. each]

   a. $\frac{-7\pi}{3}$

   b. 210^{o}

3. Explain why using words and pictures that if angles α and θ have the same reference angle, $|\sin\alpha| = |\sin\theta|$ and $|\cos\alpha| = |\cos\theta|$. [5 pts.]

4. Evaluate. Show all work. [4 pts. Each]

a. $\sec\left(\frac{-5\pi}{2}\right)$

b. $\cot^{-1}\left(2\cos\frac{\pi}{6}\right)$

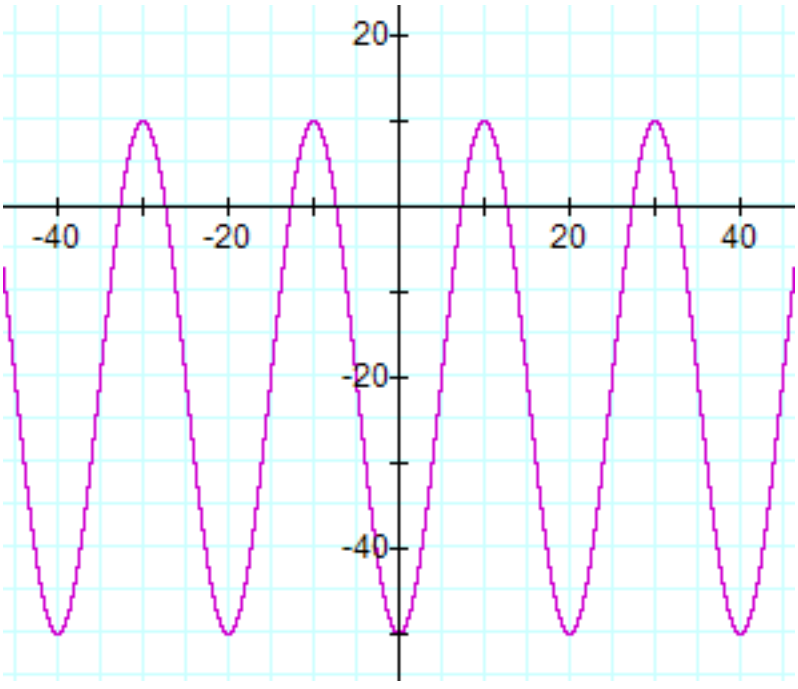
c. $\cos^2\left(\frac{-\pi}{7}\right)+\sin^2\left(\frac{-\pi}{7}\right)$

d. $\sin(\tan^{-1}\frac{3}{4})$

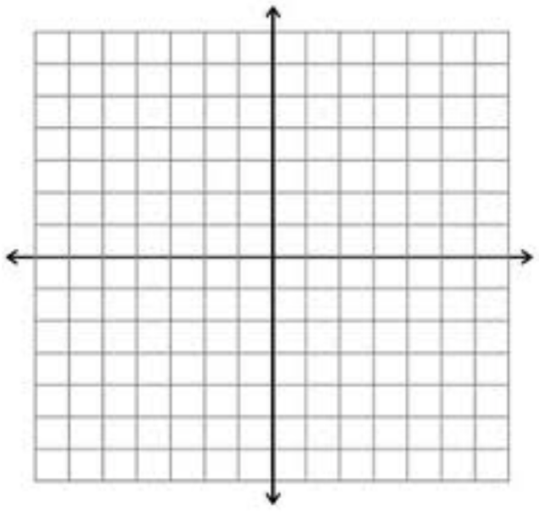
e. $\sin^{-1}\left(\frac{-1}{2}\right)$

Part II: Graphing

1. Give a sine **and** cosine equation for the following curve. [10 pts.]



1. $f(x)=2^x+3$
$g(x)=\log_2(x-3)$



State the domain and range.

	Domain	Range
f(x)		
g(x)		

Draw the line y=x on the same graph in a different color. What do you notice about the graphs of f(x) and g(x)?

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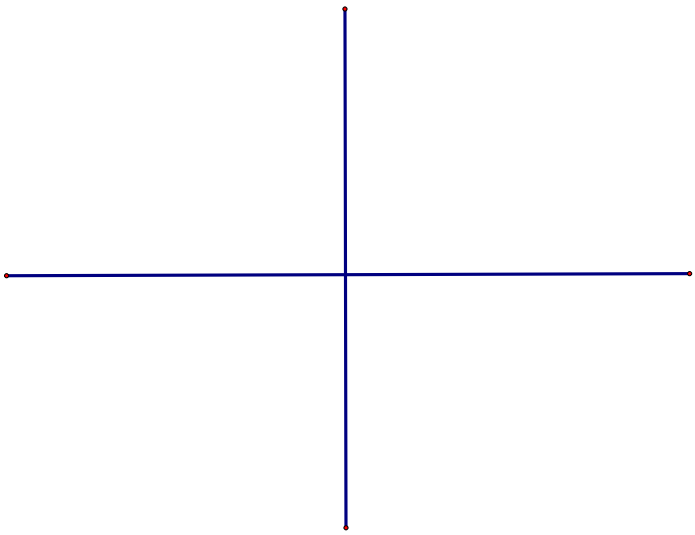
1. Graph the following functions. Label one important point and the asymptote. State domain and range for each.

a. $f(x)=3^x$
$g(x)=3^{-x+1}-2$
$h(x)=-3^{x-3}+1$
$j(x)=(\frac{1}{3})^x$

b. $f(x)=\log_3 x$
$g(x)=\log_3(x-5)+4$
$h(x)=-\log_3(x)-2$

2) When interviewing Donald Trump and Joe Biden, the moderator walks in an elliptical orbit around the two candidates. The two presidential candidates are seated at the foci of the ellipse.

a) The moderator's path follows the elliptical equation $2x^2 - 24x + y^2 - 28 = 0$. Draw a neat and labeled graph of the path.



b) Using your graph in b), determine at which points the candidates are sitting, and how far apart they are sitting.

2. The stray-cat population in Hanoi grows exponentially. In 1999, the town had 30 stray cats and the relative growth rate was 15% per year.

   a. Find a function that models the stray-cat population $n(t)$ after t years.

   b. Find the projected population in 2009.

   c. Find the number of years required for the stray-cat population to reach 500.