1. Express each of the angles of the triangle with sides of 5, 12, and 13 units in terms of either radian measure or in terms of an inverse trigonometric function of some ratio (i.e. your answer may be in terms of $\cos^{-1}$, $\sin^{-1}$, or $\tan^{-1}$).

2. What is the domain and range/image of the inverse sine function $\sin^{-1}$? Does $\sin^{-1} 3$ make sense?

3. A ladder is leaning against a vertical wall and the bottom end makes an angle of $\tan^{-1} 7$ with the horizontal. The bottom end of the ladder is 3 feet from the wall. How long is the ladder?

4. Find the area enclosed by the unit circle which lies to the right of the line $x = 1/2$.

5. A function $f$ is said to be even if $f(x) = f(-x)$ for all real numbers $x$ in its domain. It is said to be odd if $f(x) = -f(-x)$ for all real numbers $x$ in its domain. Which of the following functions are even? odd? neither?

5a. $f(x) = x^2 + 6 + 2 \cos x$.
5b. $f(x) = 7x + 6$.
5c. $f(x) = \sin(3x) - x$.
5d. $f(x) = \tan x + \sin x$.

6. A function $f$ is said to be periodic if there exists a positive constant $P$ such that $f(x + P) = f(x)$ for all real numbers $x$ in its domain. Which of the following functions are periodic? If they are, what is the period?

6a. $\sin(4x + 3)$.
6b. $A \sin(Cx) + B \cos(Cx)$ ($A$, $B$, and $C$ are constants).
6c. $\sin^{-1} x$.
6d. $\sin(3x) + 7 \sin(4x)$.

7. How many times does the function $\sin(2\pi x)$ oscillate over the interval $[1,2]$? over the interval $[2,4]$? over the interval $[4,8]$?

8. How many times does the function

$$\sin \frac{2\pi}{x}$$

oscillate over the interval $[1/2,1]$? over the interval $[1/4,1/2]$? over the interval $[1/8,1/4]$? How many times does this function oscillate over the half-open interval $(0,1]$?

9. Why is $-e^x \leq e^x \sin x \leq e^x$ for all real numbers $x$? When is $e^x \sin x$ equal to one of $-e^x$ or $e^x$? Sketch graphs of $y = -e^x$ and $y = e^x$. Sketch a graph of $y = e^x \sin x$. 

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