Please use lots of space and explain your answers, showing clearly any work you had to do. Each question is worth 3 points.

---

(1) Use the coordinates of points at the top, bottom, left and right of the unit circle to fill out this table – these are the quarter points:

t	$\cos t$	$\sin t$
0		
$\pi/2$		
π		
$3\pi/2$		
2π		

(2) For the function $f(x) = 6\sin(x)$, find its amplitude, period, y-intercept, domain and range.

(3) Graph this same function $f(x) = 6\sin(x)$ using the quarter points from question 6. Show at least two periods.

(4) Graph the function $g(x) = -2\cos(x)$. Use the quarter points and show at least two periods.

(5) For the function $h(x) = \cos(\pi x + \pi/2)$, find its

  (a) amplitude,

  (b) period,

  (c) phase shift, (you should get a negative number).

  (Hint: for $A\sin(Bx - C)$ and $A\cos(Bx - C)$, the amplitude is $|A|$, the period is $2\pi/|B|$ and the phase shift is C/B.)

(6) Graph this same function $h(x) = \cos(\pi x + \pi/2)$, showing two periods. To get credit, do this carefully: label and number the axes, show where the quarter points are.

(7) Draw a clear and neat graph of $y = \tan x$ showing at least two periods and indicating the vertical asymptotes.

(8) We saw in class that there is a problem in getting the inverse function of sine. For example
$$\sin(-7\pi/4) = \sin(-5\pi/4) = \sin(\pi/4) = \sin(3\pi/4) = \sqrt{2}/2.$$
So sine sends all of these xs to $\sqrt{2}/2$. The inverse is supposed to reverse this and send $\sqrt{2}/2$ back to x. But which x?

In other words, what is $\sin^{-1}(\sqrt{2}/2)$? Explain.

(Hint: answer must be between $-\pi/2$ and $\pi/2$ for inverse sine.)

(9) Find the exact value of $\sin^{-1}(1/2)$

(Hint: which special angle x has $\sin x = 1/2$.)

(10) Find $\cos^{-1}(0)$

(Answer should be between 0 and π for inverse cosine.)

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

(12) A right triangle has a base of length 5 and a hypotenuse of length 7. What is the size of the angle between the base and the hypotenuse? Give the answer in degrees.

If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes and section in the textbook.

- Check if you get the right answer for a similar odd-numbered question in the textbook (answers at the back of the book).

- Ask me about it after class.

- Come to my office hours: Mon 12:00 - 1:00, Wed 12:00 - 1:00 in CP 317.

- Go to the Math Tutorial Lab in-person in CP 303 or online.