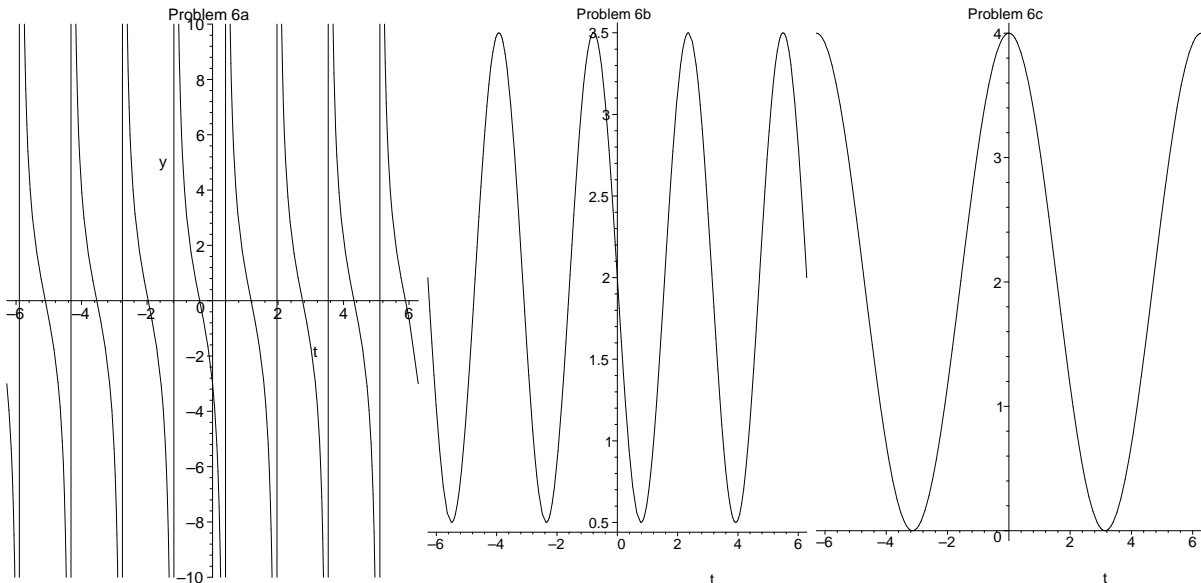
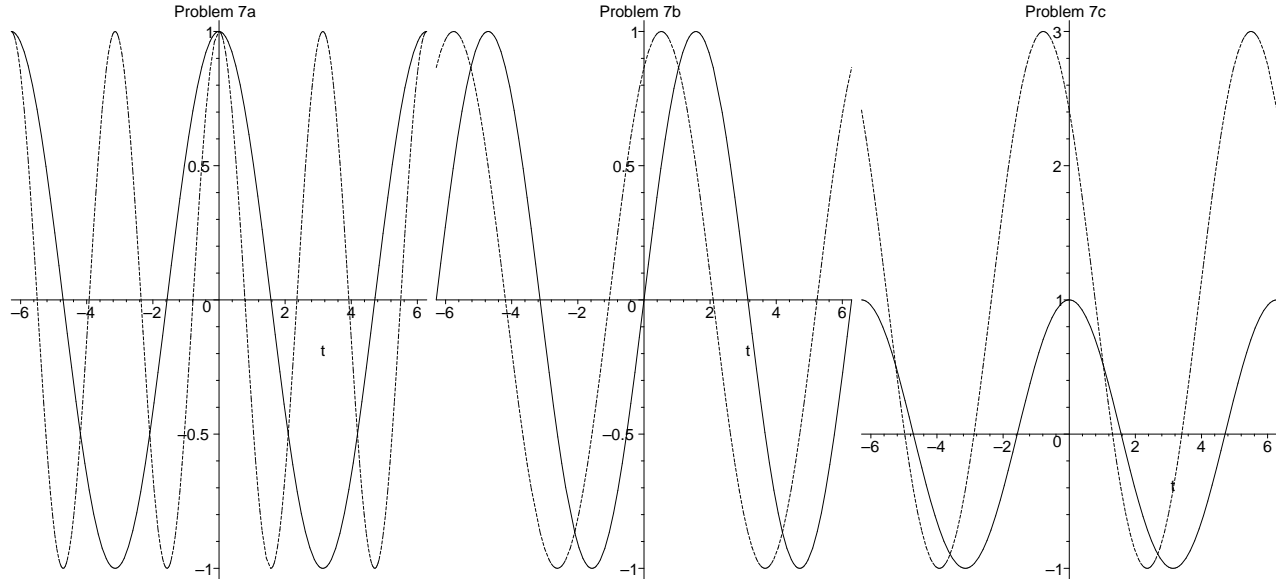


Practice Problems  
Math 1060  
September 16, 2002

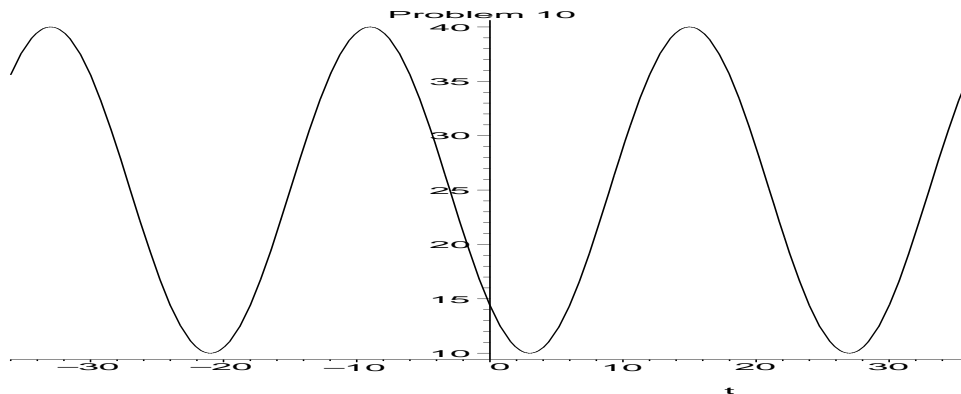
1. If  $\tan \theta = 3/4$  and  $\cos \theta < 0$  find
  - (a)  $\cos \theta$
  - (b)  $\sin \theta$
  - (c)  $\sec \theta$
2. If  $\cot \theta = -1/2$  and  $\sin \theta > 0$  find
  - (a)  $\sin \theta$
  - (b)  $\cos \theta$
  - (c)  $\tan \theta$
  - (d)  $\csc \theta$
3. Suppose  $\tan \theta = \sqrt{3}$ . Find  $\theta$  if
  - (a)  $\pi/2 \leq \theta < 3\pi/2$
  - (b)  $-3\pi/2 \leq \theta < -5\pi/2$
  - (c)  $\pi \leq \theta < 2\pi$
4. Find all the solutions  $\theta$  to the following equations with  $0 \leq \theta < 2\pi$ .
  - (a)  $\sin \theta = 1/\sqrt{2}$
  - (b)  $\tan \theta = -\sqrt{3}$
  - (c)  $\sin \theta = \cos \theta$
  - (d)  $\sin^2 \theta = 1 + 2 \cos \theta$
5. Sketch graphs of the following functions. From each sketch, read off the amplitude, phase shift, period and displacement.
  - (a)  $f(t) = 4 \sin(3t + \pi/4) - 1$
  - (b)  $f(t) = -2 \cos(4t - \pi/3) + 2$
  - (c)  $f(t) = 3 \tan(-3t) + 1$
6. Reconstruct each of the following functions from their graphs and read off the amplitude, phase shift, period and displacement.



7. In each part below, the graph of  $f$  is drawn with a solid line and the graph of  $g$  is drawn with a dashed line. For each pair  $f, g$  describe how the two functions differ (e.g. by a vertical or horizontal translation) and write down a functional relation for  $f$  and  $g$  (e.g. one of the functional relations is  $g(x) = f(2x)$ ).



8. Suppose an observer in a lighthouse 350 feet above sea level sees two ships directly offshore. (You can take the shoreline to be a straight line and the ships to be arranged in a straight line perpendicular to the shoreline.) If the angles of depression to the ships are  $\pi/100$  and  $\pi/75$ , how far apart are the ships?
9. Suppose you want to model the depth of the water at the end of a certain dock using a trigonometric function. Measurements show that the largest depth occurs at 4AM and it is 15 feet. Moreover, the average depth during a given day is 10 feet.
- Sketch a graph of  $D(t)$ .
  - Find a function to model the depth of the water of the form  $D(t) = a \cos(b(t - c)) + d$ , where  $D(t)$  is the depth at time  $t$  and  $t$  measures hours after midnight.
  - Find a function to model the depth of the water of the form  $D(t) = \hat{a} \sin(\hat{b}(t - \hat{c})) + \hat{d}$ , where  $D(t)$  is the depth at time  $t$  and  $t$  measures hours after midnight.
  - Suppose a boat requires a depth of at least 8 feet to safely moor to the dock. During what hours can this boat safely moor?
10. Suppose the average daily temperature during the month of January is given by the following graph.



- What is the average temperature during the day?
- What is the peak temperature and when does it occur?
- Find a function to model the temperature of the form  $T(t) = a \cos(bt + c) + d$ .
- How many hours pre day is the temperature greater than (or equal to) 30 degrees?