

Newberger, MATH 112, Spring 05

Homework: Transforming Graphs

Due Tuesday, March 29.

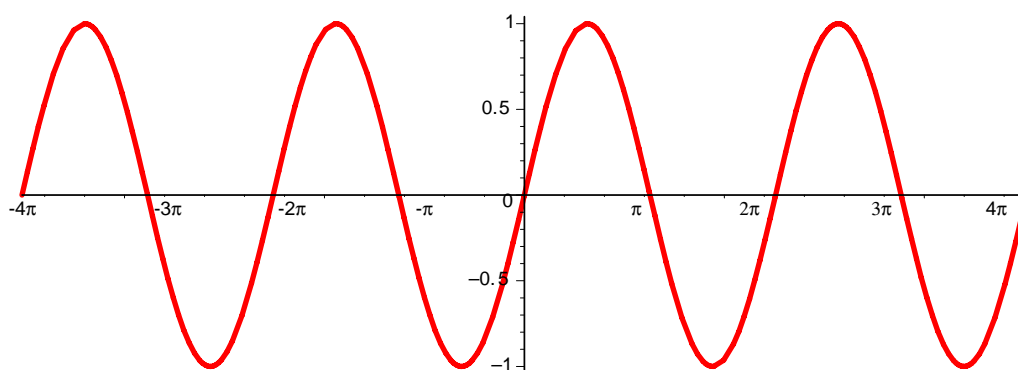
- (1) Do problems #12, 13, 15, 16 on page 256. In each problem, you will write the formula for g . In addition, write a sentence saying how the graph of g was obtained from the graph of f . For example, on number 11, you could say “The graph of g was obtained from the graph of f by shifting 2 the graph of f by units to the right.”
- (2) Do problem 20. Copy the original graph into your homework and label it $g(x)$. Graph each of the functions listed in (a)-(f) on separate graphs. Warning: on part (b) you must do the shift first and the reflection second. This is because the number x that you plug in first gets 1 added to it (the shift) and then gets squared and is multiplied by -1 last (which is the reflection). Pay attention on part (e) as well. Figure out what happens first to the x , and do it first on your transformation.
- (3) Do problem #22 on page 267.
- (4) Suppose $f(x)$ is a function with domain $[a, b]$ and range $[c, d]$. Your answers to the following questions will be in terms of a, b, c and d .
 - (a) What are the domain and range of $-f(x)$?
 - (b) What are the domain and range of $f(x + 2)$?
 - (c) What are the domain and range of $f(x) + 3$?
- (5) See the next page.

(5) Below, the graphs of sine and cosine are shown. You will figure out ways in which you can transform the graphs to obtain trigonometric formulas.

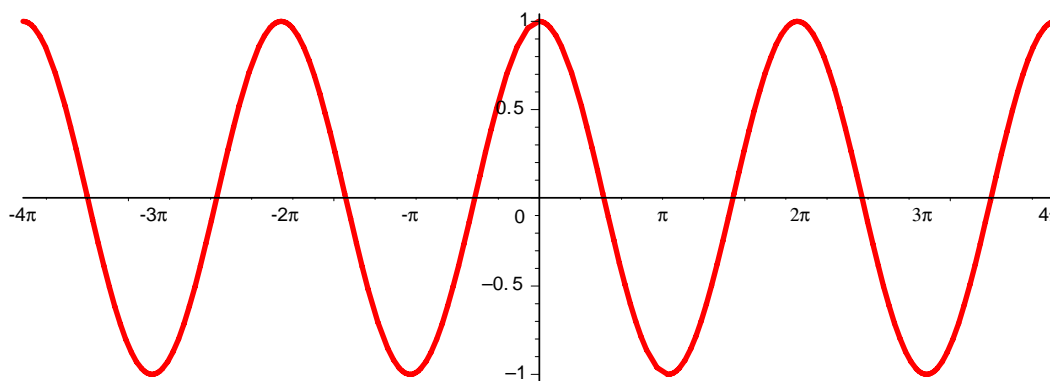
Here is an example in which we transform the cosine function to get a formula. If you reflect the graph of cosine across the y -axis, the graph stays the same. The formula for the unaltered graph is $\cos(x)$. The formula for the graph reflected across the y -axis is $\cos(-x)$. So we get the identity.

$$\cos(x) = \cos(-x).$$

$\sin(x)$



$\cos(x)$



- Notice that the graph of sine does change if you reflect it across the y -axis, so transforming the graph by a single reflection across the y -axis does not give us a formula. However, if you reflect it across the y -axis and then reflect it across the x -axis, you will get the original graph. What formula does this give us?
- What can you do to the graph of sine to transform it to the graph of cosine? To answer, write three trigonometric identities involving sine and cosine derived from shifting one graph (and its formula) into the other. Describe what transformations you used in words. Try to use as many different types of transformations as you can.