

## Project 1: Graphs of Sine and Cosine

Read the directions carefully! Points will be deducted for missing parts. Turn in pages 2 through 5, stapled in order, with your group members' names at the bottom of page 2. This project is worth 36 points.

### Objectives:

1. Understand the definition of  $\sin(x)$  and  $\cos(x)$  for all angles.
2. Practice labeling and memorizing the standard **degree** angles on the unit circle.
3. Practice visualizing the unit circle definitions of  $\sin(x)$  and  $\cos(x)$ .
4. Create good graphs by hand, as a way of working to understand and memorize the sine and cosine functions' behavior.

### Directions for the graph of $y = \sin(x)$ : Do on pages 2 and 4.

1. Use your protractor to draw the standard angles accurately on the graph of the unit circle.
2. Label each angle with the proper degree measure, from  $0^\circ$  to  $360^\circ$ . \*
3. **Draw vertical lines all around the unit circle, showing  $\sin(x)$  for every angle you've drawn.** \*
4. Fill in the table with the values of  $\sin(x)$ , through  $x = 360^\circ$ . (Some have been filled in for you.)
5. Graph  $y = \sin(x)$  on page 4, being neat and exact. Label each point from your table with its exact coordinates. Go all the way from the left edge to the right edge of the graph paper.

### Directions for the graph of $y = \cos(x)$ : Do on pages 3 and 5.

1. Use your protractor to draw the standard angles accurately on the graph of the unit circle.
2. Label each angle with the proper degree measure, from  $0^\circ$  to  $360^\circ$ . \*
3. **Draw horizontal lines all around the unit circle, showing  $\cos(x)$  for every angle you've drawn.** \*
4. Fill in the table with the values of  $\cos(x)$ , through  $x = 360^\circ$ . (Some have been filled in for you.)
5. Graph  $y = \cos(x)$  on page 5, being neat and exact. Label each point from your table with its exact coordinates. Go all the way from the left edge to the right edge of the graph paper.

\* These steps have been done for the angle  $30^\circ$  as an example.

### Point Breakdown

18 pts for sine, 18 for cosine

↳ • 2 for drawing angles

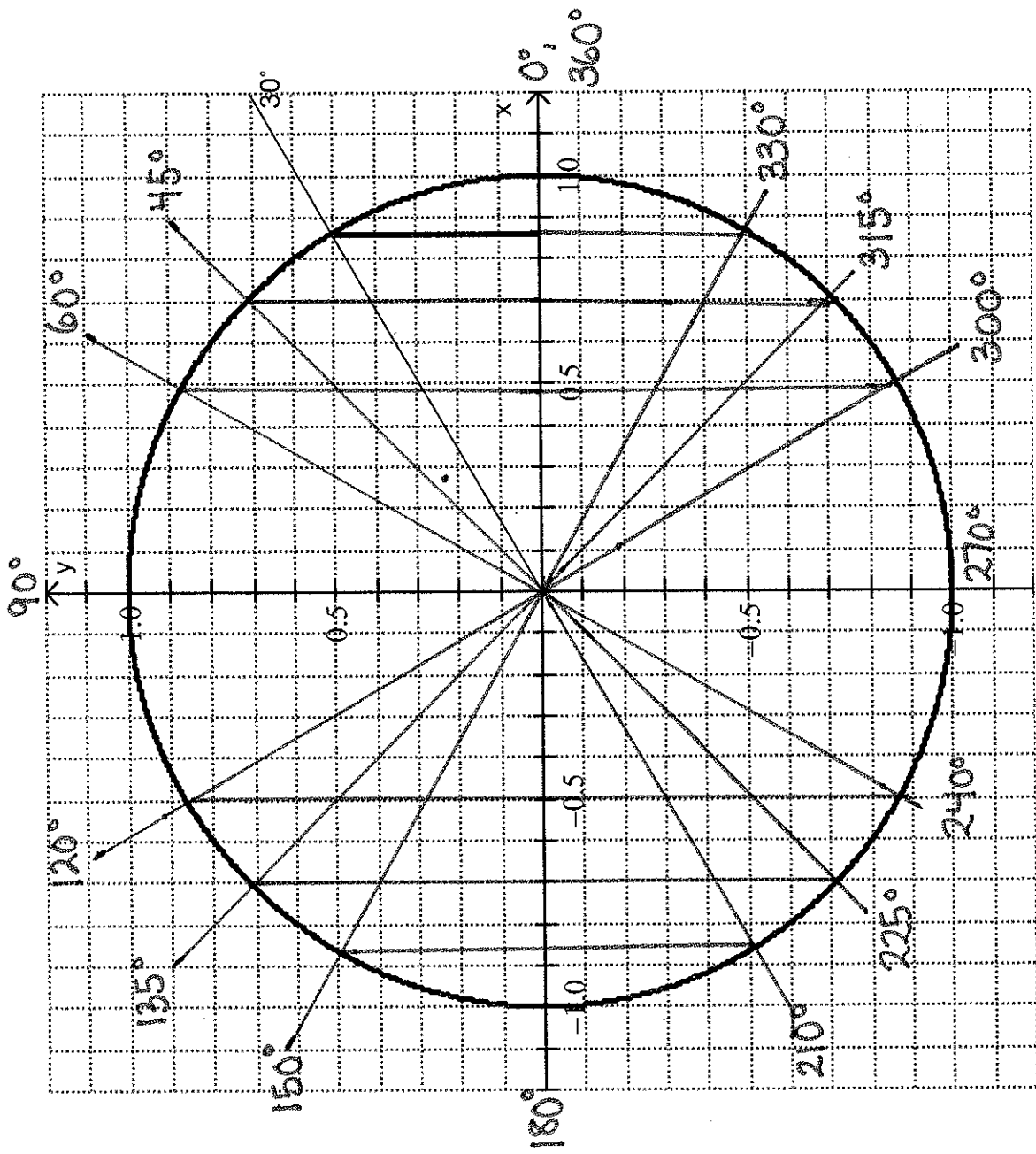
• 2 for labeling angles

• 2 for drawing vertical/horizontal lines

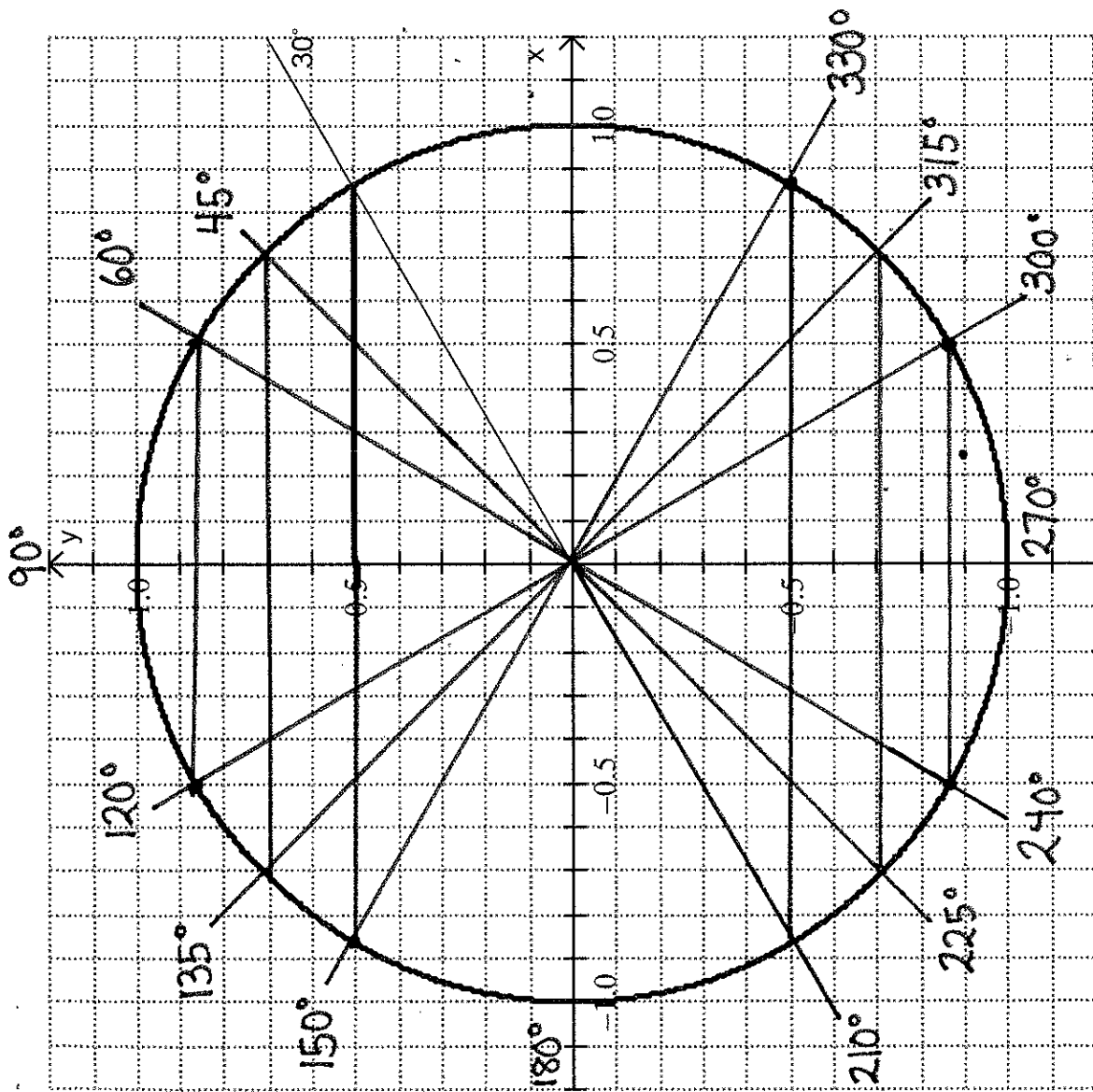
• 4 for the table of values

• 4 for a neat, accurate graph

• 4 for labeling points on the graph

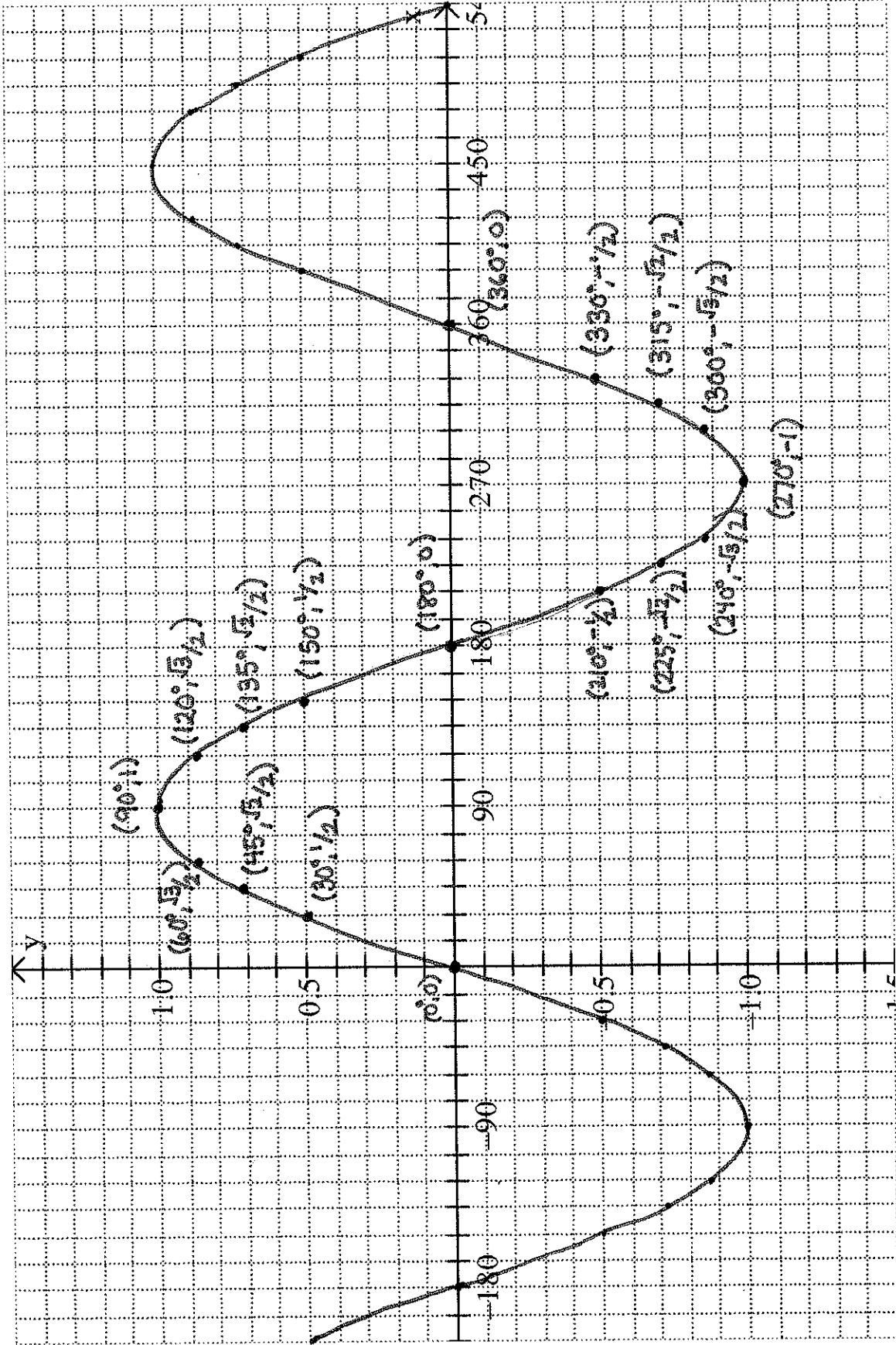


$x$ (in degrees)	$\sin(x)$ (decimal)	$\sin(x)$ (radical or fraction)
$0^\circ$	0.00	0
$30^\circ$	0.50	$\frac{1}{2}$
$45^\circ$	0.71	$\frac{\sqrt{2}}{2}$
$60^\circ$	0.87	$\frac{\sqrt{3}}{2}$
$90^\circ$	1.00	1
$120^\circ$	0.87	$\frac{\sqrt{3}}{2}$
$135^\circ$	0.71	$\frac{\sqrt{2}}{2}$
$150^\circ$	0.50	$\frac{1}{2}$
$180^\circ$	0	0
$210^\circ$	-0.50	$-\frac{1}{2}$
$225^\circ$	-0.71	$-\frac{\sqrt{2}}{2}$
$240^\circ$	-0.87	$-\frac{\sqrt{3}}{2}$
$270^\circ$	-1	-1
$300^\circ$	-0.87	$-\frac{\sqrt{3}}{2}$
$315^\circ$	-0.71	$-\frac{\sqrt{2}}{2}$
$330^\circ$	-0.50	$-\frac{1}{2}$
$360^\circ$	0	0



$x$ (angle)	$\cos(x)$ (decimal)	$\cos(x)$ (radical or fraction)
$0^\circ$	1.00	1
$30^\circ$	0.87	$\frac{\sqrt{3}}{2}$
$45^\circ$	0.71	$\frac{\sqrt{2}}{2}$
$60^\circ$	0.50	$\frac{1}{2}$
$90^\circ$	0.00	0
$120^\circ$	-0.5	$-\frac{1}{2}$
$135^\circ$	-0.71	$-\frac{\sqrt{2}}{2}$
$150^\circ$	-0.87	$-\frac{\sqrt{3}}{2}$
$180^\circ$	-1	-1
$210^\circ$	-0.87	$-\frac{\sqrt{3}}{2}$
$225^\circ$	-0.71	$-\frac{\sqrt{2}}{2}$
$240^\circ$	-0.5	$-\frac{1}{2}$
$270^\circ$	0	0
$300^\circ$	0.5	$\frac{1}{2}$
$315^\circ$	0.71	$\frac{\sqrt{2}}{2}$
$330^\circ$	0.87	$\frac{\sqrt{3}}{2}$
$360^\circ$	1	1

$$y = \sin x$$



$$y = \cos x$$

