

AP Precalculus

Polar Graphs from Tables

Polar Graphs from Tables | APPC-U03-P25

96 problems · Four activity formats

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Topic focus

Across 96 tasks this topic asks for two new rows and adequacy explanation, two radius values, ordered rows, directed partial trace, polar graph and directed trace.

8 PDFs and a README; 93 buyer pages.

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Name: _____ Date: _____ Class: _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

Complete the radius column for $r = 2$ at $\theta = 0, \frac{\pi}{2}$, and π, preserving the given angle order. _____ Bank label: _____	For $r = 1 + \sin \theta$, evaluate the outputs at $0, \frac{\pi}{2}$, and π and place them in the same order. _____ Bank label: _____
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Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Plot the ordered table for $r = 1$ and add an arrow showing the direction as θ increases from 0 to 2π. Required response <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>0</td><td>1</td></tr> <tr><td>$\frac{\pi}{2}$</td><td>1</td></tr> <tr><td>π</td><td>1</td></tr> <tr><td>$3\frac{\pi}{2}$</td><td>1</td></tr> <tr><td>2π</td><td>1</td></tr> </table> 	0	1	$\frac{\pi}{2}$	1	π	1	$3\frac{\pi}{2}$	1	2π	1	Sketch only the portion traced by $r = 2$ for $0 \leq \theta \leq \frac{\pi}{2}$, marking both endpoint statuses.
0	1										
$\frac{\pi}{2}$	1										
π	1										
$3\frac{\pi}{2}$	1										
2π	1										
The $\theta - r$ graph is the horizontal line $r = 3$ for one full turn. Which plane trace matches, and why is the line $y = 3$ not the same graph? 	The listed samples for $r = \sin(2\theta)$ are all zero. Explain why they do not show the trace, then evaluate the proposed extra input $\frac{\pi}{4}$. Required response <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>0</td><td>0</td></tr> <tr><td>$\frac{\pi}{2}$</td><td>0</td></tr> <tr><td>π</td><td>0</td></tr> </table> 	0	0	$\frac{\pi}{2}$	0	π	0				
0	0										
$\frac{\pi}{2}$	0										
π	0										
Use the ordered rows for $r = \theta$ to construct the trace on $[0, \frac{\pi}{2}]$ and describe its direction. Required response <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>0</td><td>0</td></tr> <tr><td>$\frac{\pi}{4}$</td><td>$\frac{\pi}{4}$</td></tr> <tr><td>$\frac{\pi}{2}$</td><td>$\frac{\pi}{2}$</td></tr> </table> 	0	0	$\frac{\pi}{4}$	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{\pi}{2}$	Evaluate $r = 2 \cos \theta - 1$ at the four listed angles. Keep zero and negative outputs unchanged for later plotting. The supplied angles, in order, are $\theta = 0, \frac{\pi}{3}, \pi, 3\frac{\pi}{2}$. 				
0	0										
$\frac{\pi}{4}$	$\frac{\pi}{4}$										
$\frac{\pi}{2}$	$\frac{\pi}{2}$										

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Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: $(0, 1), (\frac{\pi}{4}, 0), (\frac{\pi}{2}, -1), (\pi, -1)$ Determine the plane arc traced by $r = -1$ for $0 \leq \theta \leq \frac{\pi}{2}$.

Required response

0	-1
$\frac{\pi}{2}$	-1

Your response: _____

Incoming: The upper arc from filled $(2, 0)$ through $(1, 1)$, approaching but not including the pole.Complete the table for $r = 3 \cos \theta$ at $\frac{\pi}{6}, \frac{\pi}{2}$, and $5\frac{\pi}{6}$.

Your response: _____

Incoming: An outward quadrant-III curve from $(-1, 0)$ to $(0, -\frac{3}{2})$, with both endpoints filled.Determine the portion traced by $r = -1$ for $-\pi \leq \theta \leq \frac{\pi}{2}$, including its direction.

Required response

$-\pi$	-1
$-\frac{\pi}{2}$	-1
0	-1
$\frac{\pi}{2}$	-1

Your response: _____

Incoming: A three-quarter unit-circle arc from $(1, 0)$ through $(0, 1), (-1, 0)$, to $(0, -1)$.Sketch the windowed trace of $r = \theta + \pi$ from $\theta = -\pi$ to $\theta = -\frac{\pi}{2}$.

Required response

$-\pi$	0
$-3\frac{\pi}{4}$	$\frac{\pi}{4}$
$-\frac{\pi}{2}$	$\frac{\pi}{2}$

Your response: _____

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

A student replaces the negative output of $r = \cos \theta$ by its magnitude. Repair the $\theta = \pi$ row and state where that signed-radius point plots.

Required response

0	1
$\frac{\pi}{2}$	0
π	1

A student submits the horizontal $\theta - r$ graph as the plane trace of $r = 2$. Explain the coordinate-system confusion and replace it with the correct polar graph.

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Full Worked Solutions - excerpt

Worked example

Problem. Evaluate $r = 2 + \sin \theta - \cos \theta$ at the four quadrantal angles.

Answer. $(0, 1), (\frac{\pi}{2}, 3), (\pi, 3), (3\frac{\pi}{2}, 1)$

Explanation and check.

Insert the four sine-cosine pairs $(0, 1), (1, 0), (0, -1)$, and $(-1, 0)$ into the rule.

Worked example

Problem. Compute $r = 2 \sin \theta + \cos(2\theta)$ at the four quadrantal angles.

Answer. $(0, 1), (\frac{\pi}{2}, 1), (\pi, 1), (3\frac{\pi}{2}, -3)$

Explanation and check.

Substitution gives $0 + 1, 2 - 1, 0 + 1$, and $-2 - 1$, respectively.