

AP Precalculus

Cotangent Functions

Cotangent Functions | APPC-U03-P20

96 problems · Four activity formats

01	Answer Bank Challenge	24 tasks
02	Grid Rounds	24 tasks
03	Match & Move	24 cards
04	Error Analysis & Strategy	24 tasks
05	Quick Answer Key	96 answers
06	Full Worked Solutions	96 solutions
07	Teacher / Parent Use Guide	included
08	Terms of Use & License	included

Topic focus

Across 96 tasks this topic asks for cotangent status and value, family of compatible rules and missing evidence, sign and domain on each interval, period consecutive pole and zero, range and existence of local extrema and values and domain explanation.

8 PDFs and a README; 142 buyer pages.

AP Precalculus

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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.

Use $\sin \theta = \frac{1}{2}$ and $\cos \theta = \frac{\sqrt{3}}{2}$ to find $\cot \theta$.

Solve the problem, then match the entire requested response to one unused entry in the Answer Bank.

Condition or evidence	Supplied value
Given $\cos \theta$	$\frac{\sqrt{3}}{2}$
Given $\sin \theta$	$\frac{1}{2}$

Bank label: _____

AP Precalculus

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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: $(a, b) = (2, 2)$ and $(-2, -2)$

For $y = 3 \cot(-x + \frac{\pi}{5})$, solve for its pole and zero families and state the period and branch direction.

Solve the card and move only to the card whose incoming header matches the entire requested response.

Condition or evidence	Supplied value
Original rule	$y = 3 \cot(-x + \frac{\pi}{5})$

Your response: _____

AP Precalculus

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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.

Assess the statement “ $\cot x = \frac{1}{\tan x}$ for every real x .” Give a corrected domain-qualified statement and one counterexample to the original.

Identify the error or first invalid step, give the corrected result, and state a brief mathematical reason.

Condition or evidence	Supplied value
Statement to examine	$\cot x = \frac{1}{\tan x}$ for every real x

Cotangent Functions

Full Worked Solutions - excerpt

Worked example

Problem. For $y = 2 \cot(3x)$, state the period, all pole locations, all zeros, and the direction of each branch.

Show a complete response in the numbered workspace, preserving requested exactness, units, interval endpoints, and justification.

Condition or evidence	Supplied value
Original rule	$y = 2 \cot(3x)$

Answer. period $\frac{\pi}{3}$; poles $x = k\frac{\pi}{3}$; zeros $x = \frac{\pi}{6} + k\frac{\pi}{3}$; decreasing branches

Explanation and check.

Set $3x = k\pi$ for poles and $3x = \frac{\pi}{2} + k\pi$ for zeros. The positive output factor preserves cotangent's decreasing direction.

Worked example

Problem. For $y = (\frac{1}{2}) \cot(4(x - \frac{\pi}{8}))$, find the period and give the first pole and first zero at or to the right of $x = \frac{\pi}{8}$.

Show a complete response in the numbered workspace, preserving requested exactness, units, interval endpoints, and justification.

Condition or evidence	Supplied value
Original rule	$y = (\frac{1}{2}) \cot(4(x - \frac{\pi}{8}))$

Answer. period $\frac{\pi}{4}$; pole $x = \frac{\pi}{8}$; zero $x = \frac{\pi}{4}$

Explanation and check.

Input scale 4 gives period $\frac{\pi}{4}$. Starting at the phase pole, a zero lies half a period, $\frac{\pi}{8}$, later.