Sets & Steps
Math Practice & Worked Solutions

Precalculus

Inverse Functions to Inverse Trigonometry | 6-Topic Precalculus Bundle

6-topic bundle | 576 problems | Four activity formats

In every topic

Answer Bank Challenge	24 tasks
Grid Rounds	24 tasks
Match & Move	24 cards
Error Analysis & Strategy	24 tasks
Quick Answer Key and Full Worked Solutions	included
Teacher / Parent Use Guide and Terms of Use	included

Product previews

The following preview pages show the cover, all four activity formats, and worked examples for each included resource, in the listed order.

48 PDFs and 6 READMEs; 528 buyer PDF pages across the 6 products.

Preview pages are not included in the buyer page count. Check the list against resources you already own.

This is a fixed collection of the listed products. Purchase includes the existing individual resource files. To open a product's online preview, follow its title link and select View Preview.

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Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

One-to-One Functions and Domain Restrictions

One-to-One Functions and Domain Restrictions | APPC-U02-P13

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for displayed-table invertibility, finite versus continuous claim, limited conclusion, interval restriction containing both, whether interval restriction can contain both and whether full domain is one-to-one.

8 PDFs and a README; 110 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

Published by Tusils LLC.

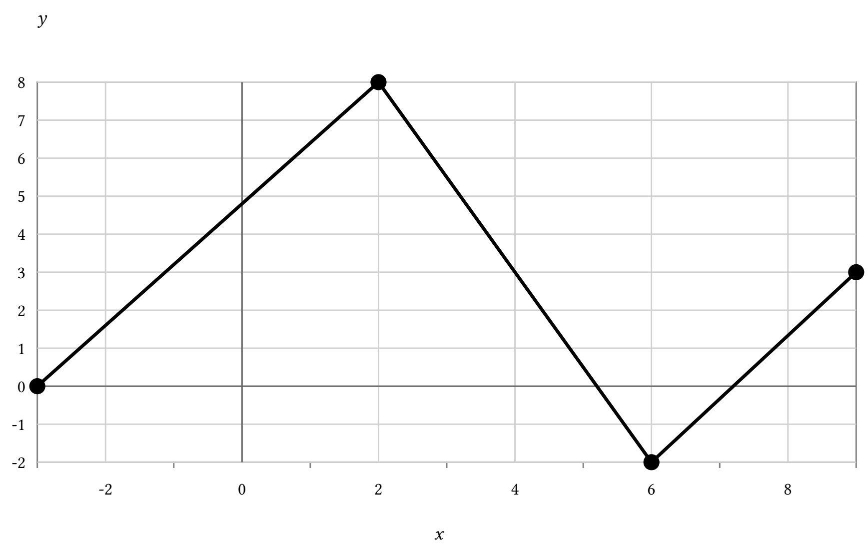
AP Precalculus

One-to-One Functions and Domain Restrictions

Name: ______________ **Date:** ______________ **Class:** ______________

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Choose the maximal one-to-one segment containing the marked input $x = 4$.



-3	0
2	8
6	-2
9	3

Bank label: ______

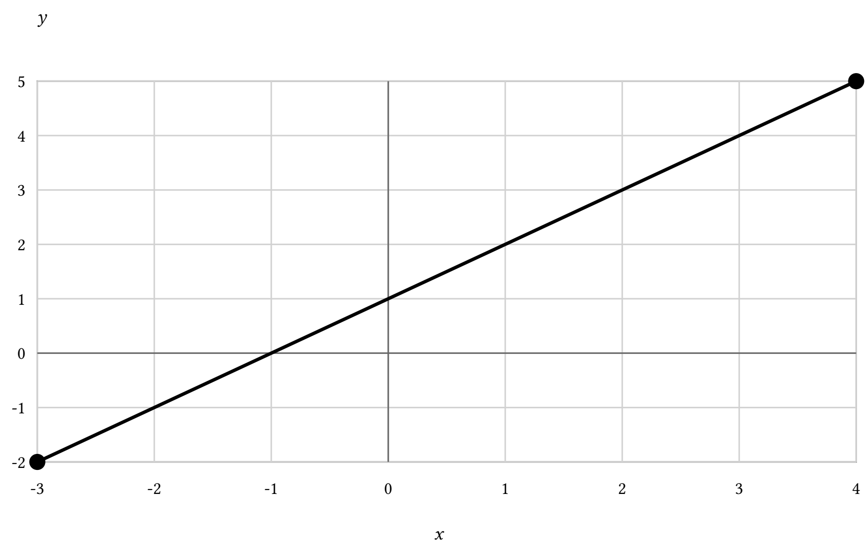
AP Precalculus

One-to-One Functions and Domain Restrictions

Name: ____________ **Date:** ____________ **Class:** ____________

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Decide whether the graphed function is one-to-one on its stated domain.



AP Precalculus

One-to-One Functions and Domain Restrictions

Name: ____________ **Date:** ____________ **Class:** ____________

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: $[-2, 3]$.

Select the time domain that makes height invertible for questions explicitly about the ascent.

Given: $0 \le t \le 8$ seconds

Height: $h(t) = 16 - (t-4)^2$ meters; Question context: recover time during ascent

Your response: ____________

AP Precalculus

One-to-One Functions and Domain Restrictions

Name: ______________ **Date:** ______________ **Class:** ______________

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.

Evaluate the cross-piece output ranges before accepting the claim. A student accepts the claim because each piece increases. Identify the invalid inference and give a cross-piece collision.

Given: $[-4, -2]$ union $[1, 3]$

Claim: Each piece is increasing, so the union is invertible.; Rule: $f(x) = x + 5$ on $[-4, -2]$; $f(x) = 2x$ on $[1, 3]$

Do the samples prove that the underlying model is invertible on all positive reals? Explain. A student says four distinct sampled outputs prove invertibility on all positive reals. Identify the unsupported extension.

Given domain/context: sampled inputs from an unspecified model

1	3
2	5
4	9
8	17

One-to-One Functions and Domain Restrictions

Full Worked Solutions - excerpt

Worked example

Problem. For which k is q_k one-to-one on the entire interval $[-2, 4]$?

Given: $-2 \leq x \leq 4$

Family: $q_k\,(x) = (x - k)^2$

Answer. $k \leq -2$ or $k \geq 4$.

Explanation and check.

The vertex must not lie in the interval's interior.

Worked example

Problem. Test the proposed restriction and either prove uniqueness or provide two allowed inputs with one output.

Given: $x \geq -1$

Claim: Restricting to $x \geq -1$ makes f invertible.; Rule: $f(x) = (x - 2)^2$

Answer. It is not sufficient: $f(1) = f(3) = 1$, and both inputs satisfy $x \geq -1$.

Explanation and check.

The restricted interval still crosses the vertex at $x = 2$.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Finding Inverse Functions

Finding Inverse Functions | APPC-U02-P14

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for eighth-root inverse and domain, inverse and bounded domain, inverse and domain, inverse and finite domain, inverse branch rules and intervals and inverse branches with open images.

8 PDFs and a README; 80 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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AP Precalculus

Finding Inverse Functions

Name: __________ **Date:** __________ **Class:** __________

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Reverse all three associations.

Required output: inverse mapping

Input	**Output**
-1	6
4	2
8	11

Bank label: ______

Solve the rational relation for its original input.

Domain: x is not -1

Given rule: $f(x) = \frac{x-2}{x+1}$

Bank label: ______

Construct the model that recovers travel time from distance.

Domain: $0 \leq t \leq 12$ hours

Given distance model: $D(t) = 55t$ miles

Bank label: ______

Translate both statements into inverse notation.

Domain: an invertible function

Given facts: [”$f(2) = 13$”, ”$f(9) = -4$”]

Bank label: ______

AP Precalculus

Finding Inverse Functions

Name: ______________ **Date:** ______________ **Class:** ______________

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Reverse the finite mapping and evaluate the requested inverse value.

Required output: inverse table and $f^{-1}(8)$

Input	Output
-2	5
0	1
3	8

AP Precalculus

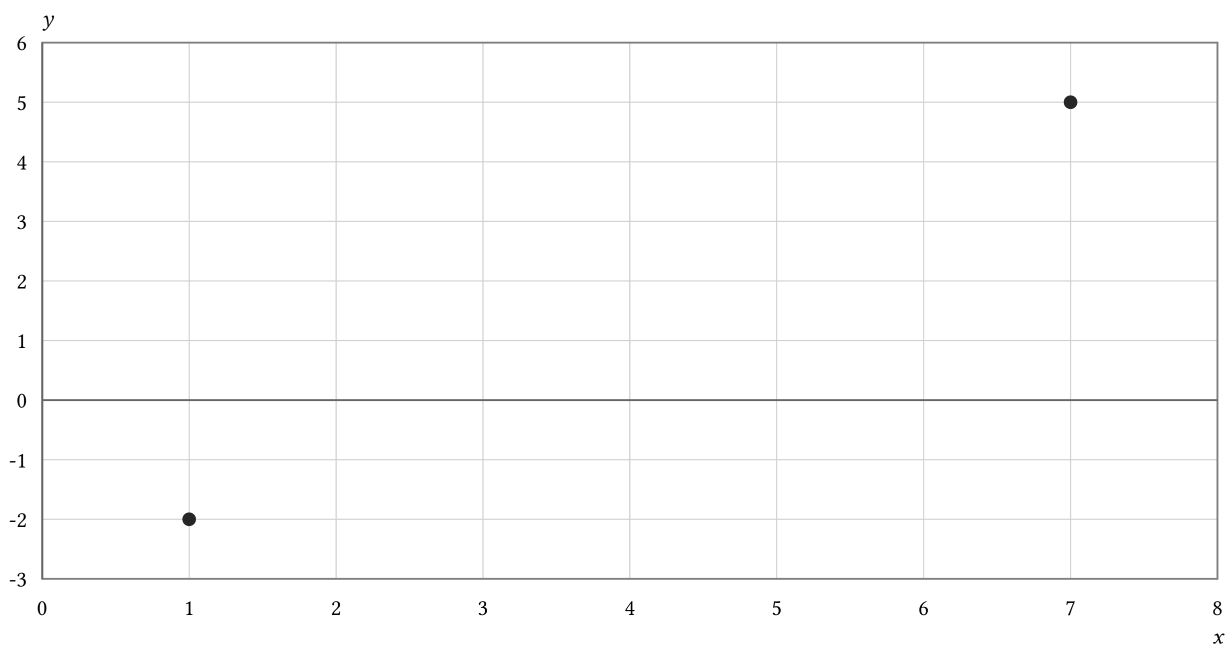
Finding Inverse Functions

Name: ______________ **Date:** ______________ **Class:** ______________

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.

START

Identify the two endpoints of the reflected inverse curve.



Your response: ______________

AP Precalculus

Finding Inverse Functions

Name: ______________________ **Date:** ______________________ **Class:** ______________________

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.

Construct the inverse of the decreasing odd-power chain. A student proposes $\sqrt[5]{x} - 2 - 7$. Locate the first incorrect inverse operation and repair the rule.

Domain: all real numbers

Given rule: $p(x) = 7 - (x + 2)^5$

Solve for the inverse and state its excluded input and output values. A student keeps $x \neq -\frac{5}{2}$ as the inverse input exclusion. Diagnose the interchange of domain and range.

Domain: x is not $-\frac{5}{2}$

Given rule: $f(x) = \frac{3x-2}{2x+5}$

Write the inverse pieces in increasing order of their new input intervals. A student reverses the formulas but keeps the original input intervals on the inverse pieces. Identify and repair the interval error.

Domain: $[-3, 0]$ union $[2, 6)$

Given rule: $f(x) = 4 - x$ for $-3 \leq x \leq 0$; $f(x) = 3x + 8$ for $2 \leq x < 6$

Construct the inverse of the decreasing radical branch and retain its exact range. A student gives $9 - x^2$ as the inverse on every real input. Explain why the algebraic expression alone is insufficient.

Domain: $0 \leq x \leq 9$

Given rule: $r(x) = \sqrt{9 - x}$

Finding Inverse Functions

Full Worked Solutions - excerpt

Worked example

Problem. Reverse the root and translations in their operational order.

Domain: all real numbers

Given rule: $h(x) = \sqrt[3]{x-4} + 2$

Answer. $h^{-1}(x) = (x-2)^3 + 4$.

Explanation and check.

Subtract 2, cube, and then add 4.

Worked example

Problem. Recover both inverse intercepts and one additional reflected point.

Domain: an invertible interval

Given facts: [" $f(0) = 9$ ", " $f(-4) = 0$ ", " $f(2) = 13$ "]

Answer. The inverse x-intercept is 9, its y-intercept is -4, and it contains $(13, 2)$.

Explanation and check.

Reflect $(0, 9), (-4, 0)$, and $(2, 13)$.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Verifying Inverse Functions

Verifying Inverse Functions | APPC-U02-P15

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for complete membership audit, complete reflection verdict, component-level verdict, distinct identities, endpoint-sensitive verdict and equality-set and identities.

8 PDFs and a README; 113 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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AP Precalculus

Verifying Inverse Functions

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.

Check whether the candidate uses the correct scale inside the cube root.

Domain: both functions on all real numbers

Given f: $f(x) = 3x^3 + 2$

Given g: $g(x) = \sqrt[3]{\frac{x-2}{2}}$

Bank label: _______

Assess whether the candidate covers the full inverse input set.

Domain: f: $1 \leq x \leq 5$; proposed g: $3 \leq x \leq 20$

Given facts: ["f is one-to-one", "range(f) = $[3, 27]$", "candidate formula is algebraically correct"]

Bank label: _______

Check whether the candidate inverse is complete.

Required output: complete verdict and the supporting evidence requested above

Input	f(input)
-7	5
-2	0
4	13
10	-3

Input	g(input)
5	-7
0	-2
-3	10

Bank label: _______

Verify each composition on its stated domain.

Domain: f: $x \geq 2$; g: $x \geq 0$

Given f: $f(x) = (x-2)^2$

Given g: $g(x) = 2+\sqrt{x}$

Bank label: _______

AP Precalculus

Verifying Inverse Functions

Name: ____________ **Date:** ____________ **Class:** ____________

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.

Audit all reversed pairs and identify any failure.

Required output: complete verdict and the supporting evidence requested above

Input	f(input)
-4	7
0	2
5	-1
8	9

Input	g(input)
7	-4
2	0
-1	5
9	6

Identify why the successful composition is insufficient on the declared domain of f.

Domain: f on all real numbers; g on $x \geq 0$

Given claim: $f(g(x)) = x$ proves they are inverses

Given f: $f(x) = x^2$

Given g: $g(x) = \sqrt{x}$

The formulas reverse algebraically. Decide whether the declared domains make them inverse functions.

Domain: f: x is not 2; proposed g: all real x

Given f: $f(x) = \frac{1}{x-2} + 5$

Given g: $g(x) = 2 + \frac{1}{x-5}$

Explain why the successful direction does not certify the larger-domain function.

Domain: f on all real numbers; g on $x \geq 0$

Given claim: $f(g(x)) = x$ for $x \geq 0$ proves inverses

Given f: $f(x) = |x|$

Given g: $g(x) = x$

AP Precalculus

Verifying Inverse Functions

Name: __________ **Date:** __________ **Class:** __________

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.

START

Determine whether the proposed inverse output set matches the original input set.

Domain: f: $-4 \le x \le 3$; proposed g range: $-4 \le y \le 4$

Given facts: ["f is one-to-one", "g domain equals range(f)", "candidate formula is correct"]

Your response: __________

Incoming: No. range(g) must end at 3, not 4; the candidate declares an output that is not in domain(f).

Check whether the extra row preserves a valid inverse function.

Required output: complete verdict and the supporting evidence requested above

Input	f(input)
-6	2
0	8
5	-1
9	12

Input	g(input)
2	-6
8	0
-1	5
12	9
8	4

Your response: __________

Incoming: No. g must have a hole at $(5, 1)$; filling it adds an inverse input absent from range(f).

Explain why the declared domain of f prevents certification.

Domain: f on all real numbers; g on $x \ge 1$

Given evidence: $f(g(x)) = x$

Given f: $f(x) = (x - 4)^2 + 1$

Given g: $g(x) = 4+\sqrt{x - 1}$

Your response: __________

Incoming: For $x < 4$, $g(f(x)) = 4 + |x - 4| = 8\text{-}x$ rather than x, so f must be restricted to $x \ge 4$.

Use the nonpositive sign of $x - 1$ when checking the reverse composition.

Domain: f: $x \le 1$; g: $x \ge 2$

Given f: $f(x) = 2 + (x - 1)^2$

Given g: $g(x) = 1-\sqrt{x - 2}$

Your response: __________

AP Precalculus

Verifying Inverse Functions

Name: ______________ **Date:** ______________ **Class:** ______________

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.

Name the additional identity and set information required.

Domain: unspecified function domains

Given claim: This alone proves f and g are inverses

Given evidence: $f(g(x)) = x$ wherever g is defined

Test the claim using composition rather than product notation.

Domain: nonzero real x

Given claim: $f^{-1}(x) = \frac{1}{2x}$

Given function: $f(x) = 2x$

Compute both round trips and certify or reject the inverse claim. Student work/claim: Checking only $f(g(x))$ for $f(x) = 3x + 2$ and $g(x) = \frac{x-2}{3}$ is enough to certify the inverse claim. Identify the first invalid inference or omitted check, correct it, and complete the original task.

Verifying Inverse Functions

Full Worked Solutions - excerpt

Worked example

Problem. Explain why the evidence does not establish an inverse pair. Choose between testing one successful input and verifying both composition identities on the full declared domains. Use the sufficient method.

Answer. One successful input can neither prove $f(g(x)) = x$ for all allowed x nor verify $g(f(x)) = x$ on the other domain.

Explanation and check.

Inverse verification requires identities on the full relevant sets, not one sample.

Worked example

Problem. Explain why an algebraic identity alone may fail to define a valid composition everywhere claimed.

Answer. Outputs of g must lie in domain(f), and domain(g) must equal range(f); otherwise the symbolic substitution can simplify where the actual composition is undefined.

Explanation and check.

Function composition is governed by declared sets as well as formulas.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Inverse Trigonometric Functions

Inverse Trigonometric Functions | APPC-U03-P16

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for valid inverse pair and reason for discarding a row, reason proposal fails and a valid restriction, validity and approximate corrected sign, defined or undefined, real-defined or undefined with failed restriction and validity and location of output.

8 PDFs and a README; 67 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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AP Precalculus

Inverse Trigonometric Functions

Name: ______________________ **Date:** ______________________ **Class:** ______________________

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Evaluate $\arcsin(-\frac{\sqrt{3}}{2})$ exactly. Identify the compatible unit-circle angle that lies in the principal range $[-\frac{\pi}{2}, \frac{\pi}{2}]$. Bank label: _______	Let $\theta = \arcsin(\frac{5}{13})$. A right triangle for θ has opposite side 5 and hypotenuse 13. Find $\cos\theta$ and explain why its sign is forced by the arcsine branch. Bank label: _______
Evaluate $\arcsin(\sin(5\frac{\pi}{6}))$. Do not cancel the two function names; use a symmetry relation to place the result in the arcsine range. Bank label: _______	Find the exact principal value of $\arccos(-\frac{\sqrt{2}}{2})$. Use the sign of cosine and the required range $[0, \pi]$ to select the angle. Bank label: _______
Set $\theta = \arccos(-\frac{8}{17})$ and represent θ by a point (x, y) on a circle of radius 17 with $x = -8$. Determine $\tan\theta$, including its sign, from the principal arccos range. Bank label: _______	In radian mode, estimate $\arcsin(0.98)$ to the nearest thousandth. Verify that the rounded result lies in the correct principal interval. Bank label: _______
Reduce $\arccos(\cos(7\frac{\pi}{6}))$ to its principal value. Explain the reflection that produces an angle in $[0, \pi]$. Bank label: _______	Evaluate $\sin(\arctan(-\frac{7}{24}))$ exactly. Build a signed coordinate triangle compatible with the inverse-tangent range rather than treating the inner ratio as a sine value. Bank label: _______

AP Precalculus

Inverse Trigonometric Functions

Name: ______________ **Date:** ______________ **Class:** ______________

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Is $\arccos(\frac{6}{5})$ defined as a real number? Name the restriction that decides the question.

AP Precalculus

Inverse Trigonometric Functions

Name: ____________ **Date:** ____________ **Class:** ____________

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: $-\frac{\pi}{6}$

Place $13\frac{\pi}{6}$ on the tangent graph and remove enough periods to reach the inverse-tangent branch. Evaluate the composition.

Your response: ____________

Incoming: y = arccos x.

Both $-\frac{\pi}{6}$ and $5\frac{\pi}{6}$ have tangent $-\frac{\sqrt{3}}{3}$. Which one equals arctan($-\frac{\sqrt{3}}{3}$), and why is the other rejected?

Your response: ____________

Incoming: $\sqrt{(1\text{-}v^2)}$, for $-1 \le v \le 1$

Estimate arccos(-0.6) to the nearest tenth of a degree. Use the negative input to check the calculator's quadrant.

Your response: ____________

Incoming: 126.9 degrees

For $\theta = \arccos(-\frac{3}{5})$, place a point of radius 5 with $x = -3$ in the correct half of the unit-circle model. Find $\sin\theta$.

Your response: ____________

Incoming: 0.045 radians

Without finding θ itself, evaluate cot(arctan($-\frac{9}{40}$)). State why this reciprocal is defined.

Your response: ____________

Incoming: $\frac{\pi}{3}$

A calculation table records arcsin(0.73) = 0.818321 in radian mode. Report the value to the nearest hundredth and verify its range.

Your response: ____________

AP Precalculus

Inverse Trigonometric Functions

Name: ____________ **Date:** ____________ **Class:** ____________

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 writes, "$\arccos(\cos(4\frac{\pi}{3})) = 4\frac{\pi}{3}$ because inverse functions cancel." Identify the failed condition and replace the conclusion with the correct principal angle.

A solution interprets $\sin^{-1}(\frac{1}{2})$ as the reciprocal $\frac{1}{\sin(\frac{1}{2})}$. Diagnose the notation error, rewrite the inverse with unambiguous notation, and evaluate it exactly.

A symbolic solution states $\tan(\arcsin u) = \frac{u}{\sqrt{1-u^2}}$ for $-1 \leq u \leq 1$. Repair the domain and explain what happens at $u = \pm 1$ in the original composition, not just in the formula.

A calculator returns 45 for $\arctan(1)$, and a student reports 45 radians. Diagnose the display and give the correct radian answer.

Inverse Trigonometric Functions

Full Worked Solutions - excerpt

Worked example

Problem. Use radian mode to approximate $\arccos(0.2)$ to three decimal places.

Answer. 1.369 radians

Explanation and check.

The calculator value $1.369438\ldots$ rounds to 1.369 radians.

Worked example

Problem. Find the domain of $G(x) = \arcsin(3 - x)$. Preserve the inequality reversal when isolating x.

Answer. $[2, 4]$

Explanation and check.

Require $-1 \leq 3 - x \leq 1$. The two bounds give $x \leq 4$ and $x \geq 2$, hence $2 \leq x \leq 4$.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus

Solving Trigonometric Equations

Solving Trigonometric Equations | APPC-U03-P17

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for count by h-region, count by level case, count for each L, number of distinct solutions for each case, solution count by case and all roots.

8 PDFs and a README; 47 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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AP Precalculus

Solving Trigonometric Equations

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.

Solve $\sin x = \frac{1}{2}$ for $0 \le x \le 2\pi$. Use both unit-circle branches and check the endpoints. Bank label: _______	Solve $\sin(2x) = 0$ on $0 \le x \le \pi$. First map the x-interval to the complete $2x$-interval, then divide the enumerated angle values by 2. Bank label: _______
Solve $2\sin^2 x - 3\sin x + 1 = 0$ for $0 \le x \le 2\pi$. Treat $u = \sin x$, solve both feasible levels, and merge any overlapping angle sets. Bank label: _______	Find every x in $[0, 2\pi)$ satisfying $\sin x \cos x = 0$. Solve the two zero factors separately and combine without duplicating any root. Bank label: _______
Solve $\frac{\sin x}{1-\cos x}$=0 on $[0, 2\pi]$. Record denominator exclusions before using numerator-zero logic. Bank label: _______	Using $\sin^2 x$ = 1-$\cos^2 x$, solve $\sin^2 x$ = 1-$\cos x$ on $[0, 2\pi)$. Keep every root produced by the resulting factored equation. Bank label: _______
Solve $\cos x = -\frac{\sqrt{2}}{2}$ for -$\pi \le x < \pi$. Use the signed unit-circle interval rather than converting the final answers to $[0, 2\pi)$. Bank label: _______	Solve $\cos(x - \frac{\pi}{3}) = \frac{1}{2}$ on $[0, 2\pi]$. Enumerate every allowed angle $x - \frac{\pi}{3}$ in the mapped window, including boundary hits. Bank label: _______

AP Precalculus

Solving Trigonometric Equations

Name: ______________ **Date:** ______________ **Class:** ______________

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.

Solve $2\sin x + 1 = 2$ for $0 \le x \le 2\pi$. Normalize the output before selecting sine branches.	For $\sin x = c$ on $[0, 2\pi)$, determine the solution count when $c = 1$, when $0 < \lvert c\rvert < 1$, when $c = -1$, and when $\lvert c\rvert > 1$. Base the count on intersections with the extrema.
Solve $-3\cos x + 2 = 5$ on $[0, 2\pi]$. After isolating cosine, use the extreme level to determine multiplicity.	Solve $\sqrt{1-\cos x}$=$\sin x$ on $[0, 2\pi]$. After squaring, substitute every candidate into the original equation to enforce the nonnegative left side.
Solve $\sin x = 2$ on $[0, 2\pi]$. Give the range-based reason for your conclusion.	Solve $\sin^2 x = \sin x$ on $[0, 2\pi)$. Explain which solutions would disappear if both sides were divided by $\sin x$.

AP Precalculus

Solving Trigonometric Equations

Name: ______________ **Date:** ______________ **Class:** ______________

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: $\{0\}$

Solve $\tan(2x - \frac{\pi}{4}) = 1$ for $0 \le x \le \pi$. Filter the angle family $\frac{\pi}{4} + k\pi$ through the mapped window.

Your response: ______________

Incoming: $[0, \frac{\pi}{2}]$ union $[3\frac{\pi}{2}, 2\pi]$

Solve $\sin^2 x - 2\sin x + 1 = 0$ on $[0, 2\pi]$. Explain why a repeated auxiliary root still produces a one-element angle set.

Your response: ______________

Incoming: $\{0, \frac{\pi}{2}, \pi, 2\pi\}$

A nonnegative graph of $(\sin x - 0.6)^2$ on $[0, \pi]$ touches zero at two certified minima. Report both roots to the nearest thousandth and explain why sign-change bracketing detects neither.

Required response

0.643501109	0
2.498091545	0

Your response: ______________

Incoming: $\{5\frac{\pi}{3}, 7\frac{\pi}{3}\}$

Solve $(2\sin x + 1)(2\sin x - 1) = 0$ on $[0, 2\pi)$. Enumerate the positive and negative half-levels separately.

Your response: ______________

Incoming: $\{\frac{\pi}{4}, 5\frac{\pi}{4}\}$

Solve $\cos(-x + \frac{\pi}{6}) = \frac{\sqrt{3}}{2}$ on $[-\pi, \pi]$. Reverse the mapped interval correctly before filtering the two cosine branches.

Your response: ______________

Incoming: $\{3.000\}$

Solve $\frac{\sin x}{\cos x} = 1$ on $[0, 2\pi)$. Preserve the cosine exclusions while using the equivalent tangent level where defined.

Your response: ______________

AP Precalculus

Solving Trigonometric Equations

Name: ______________ **Date:** ______________ **Class:** ______________

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 reports only $x = \frac{\pi}{3}$ for $\sin x = \frac{\sqrt{3}}{2}$ on $[0, 2\pi]$. Identify the missing branch and give the corrected complete set.

A student uses $a2\pi$ repeat and lists $\{-2\pi, 0, 2\pi\}$ for $\tan x = 0$ on $[-2\pi, 2\pi]$. Repair the period and include every missing root.

A solution lists both 0 and 2π for $\cos x = 1$ on $[0, 2\pi)$. Repair the set by applying the interval notation.

A solution factors $\sin^2 x + \sin x - 2 = 0$ but tries to include an angle for $\sin x = -2$. Remove the impossible auxiliary level and finish the solution on $[0, 2\pi]$.

Solving Trigonometric Equations

Full Worked Solutions - excerpt

Worked example

Problem. Solve $\cos x = -1$ on $-2\pi \leq x \leq 2\pi$. Filter the extreme-value family $\pi + 2k\pi$ through the symmetric interval.

Answer. {-π, π}

Explanation and check.

The family $x = \pi + 2k\pi$ yields -π for $k = -1$ and π for $k = 0$. Adjacent values lie outside the interval.

Worked example

Problem. Solve $5\tan x + 2 = 2$ on $[-\pi, \pi]$. Apply tangent's $\pi-$spaced zero family to the closed endpoints.

Answer. {-π, 0, π}

Explanation and check.

The equation reduces to $\tan x = 0$, whose zeros $x = k\pi$ in the interval are -$\pi, 0, \pi$.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus
Trigonometric Inequalities

Trigonometric Inequalities | APPC-U03-P18

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for closed interval to tolerance, interval to tolerance, interval union to tolerance, correct intersection and counterexample, correct interval and boundary counterexample and correct set and boundary counterexample.

8 PDFs and a README; 111 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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AP Precalculus

Trigonometric Inequalities

Name: ____________ **Date:** ____________ **Class:** ____________

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Certified numerical evidence locates the crossings of $\sin x$ and $0.2x + 0.1$ at 0.125411 and 2.498473 on $[0, 4]$. Solve the nonstrict inequality to the nearest thousandth.

Certified numerical evidence locates the crossings of $\sin x$ and $0.2x + 0.1$ at 0.125411 and 2.498473 on $[0, 4]$. Solve the nonstrict inequality to the nearest thousandth.

Supplied evidence	Value
equality points	0.125410601 2.498473192

Condition or evidence	Supplied value
Original inequality	$\sin x \geq 0.2x + 0.1$
Requested precision	nearest thousandth
Given shape evidence	the difference is nonnegative exactly between the crossings
Given window	$[0, 4]$

Bank label: ______

Solve $-2\cos x + 1 \leq 0$ on $[0, 2\pi)$. Show the order reversal caused by division by -2.

Solve $-2\cos x + 1 \leq 0$ on $[0, 2\pi)$. Show the order reversal caused by division by -2.

Condition or evidence	Supplied value
Original inequality	$-2\cos x + 1 \leq 0$
Input interval	$[0, 2\pi)$

Bank label: ______

Solve -sin$(2x - \frac{\pi}{2}) \geq 0$ on $[0, \pi]$. Track the output reversal before mapping the inner-angle intervals.

Solve -sin$(2x - \frac{\pi}{2}) \geq 0$ on $[0, \pi]$. Track the output reversal before mapping the inner-angle intervals.

Condition or evidence	Supplied value
Original inequality	-sin(2x-pi/2)>=0
Input interval	$[0, \pi]$

Bank label: ______

Solve $\sin x(1 + \cos x) \geq 0$ on $[0, 2\pi]$. Use that $1 + \cos x$ never becomes negative but does vanish at π.

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Condition or evidence	Supplied value
Original inequality	$\sin x(1 + \cos x) \geq 0$
Input interval	$[0, 2\pi]$

Bank label: ______

AP Precalculus

Trigonometric Inequalities

Name: ______________ **Date:** ______________ **Class:** ______________

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Solve $\sin x < 0$ OR $\cos x \leq 0$ on $[0, 2\pi)$. Decide which boundaries are contributed by only one condition.

Solve $\sin x < 0$ OR $\cos x \leq 0$ on $[0, 2\pi)$. Decide which boundaries are contributed by only one condition.

Condition or evidence	Supplied value
Given conditions	$\sin x < 0$ $\cos x \leq 0$
Logical connective	OR
Input interval	$[0, 2\pi)$

During $0 \leq t \leq 12$ hours, a temperature follows $T(t) = 50 + 10\sin(\pi \frac{t}{6})$. When is $T > 55$, and for how many total hours?

During $0 \leq t \leq 12$ hours, a temperature follows $T(t) = 50 + 10\sin(\pi \frac{t}{6})$. When is $T > 55$, and for how many total hours?

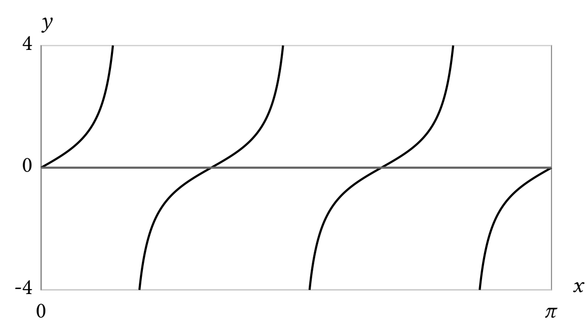
Condition or evidence	Supplied value
Required condition	$T > 55$
Given model	$T(t) = 50 + 10\sin(\pi \frac{t}{6})$
Time interval	$[0, 12]$ hours

For $0 \leq t \leq 10, V(t) = 12 + 4\cos(\pi \frac{t}{5})$. When is $V \leq 8$, and what is the total duration?

For $0 \leq t \leq 10, V(t) = 12 + 4\cos(\pi \frac{t}{5})$. When is $V \leq 8$, and what is the total duration?

Condition or evidence	Supplied value
Required condition	$V \leq 8$
Given model	$V(t) = 12 + 4\cos(\pi \frac{t}{5})$
Time interval	$[0, 10]$ hours

Solve $\tan(3x) < 0$ on $[0, \pi]$, marking the three scaled poles before reading signs.



Condition or evidence	Supplied value
Original inequality	$\tan(3x) < 0$
Input interval	$[0, \pi]$

AP Precalculus

Trigonometric Inequalities

Name: ______________ **Date:** ______________ **Class:** ______________

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: $[0, 0.125] \cup [2.498, 4]$

Solve $\tan x \geq -\sqrt{3}$ on $[0, \pi)$, treating the two sides of $\frac{\pi}{2}$ as separate branches.

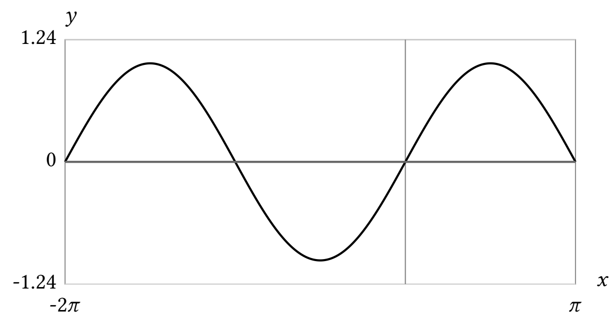
Solve $\tan x \geq -\sqrt{3}$ on $[0, \pi)$, treating the two sides of $\frac{\pi}{2}$ as separate branches.

Condition or evidence	Supplied value
Original inequality	$\tan x \geq -\sqrt{3}$
Input interval	$[0, \pi)$

Your response: ______________

Incoming: $(\frac{\pi}{2}, \pi)$

Solve $\sin x \geq 0$ on $[-2\pi, \pi]$, using signed cycles and all equality zeros.



Condition or evidence	Supplied value
Original inequality	$\sin x \geq 0$
Input interval	$[-2\pi, \pi]$

Your response: ______________

Incoming: $[-2\pi, \pi]$

Let $\alpha = \arccos(0.2)$. Solve $\cos x \leq 0.2$ on $[0, 2\pi)$ in terms of α.

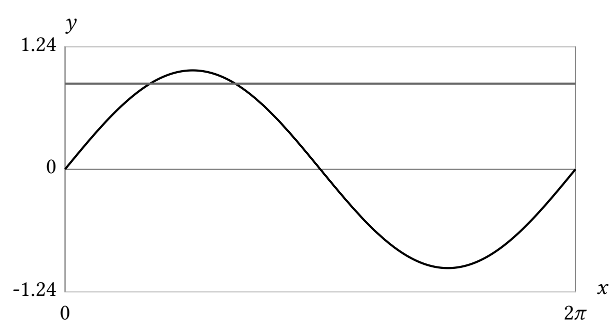
Let $\alpha = \arccos(0.2)$. Solve $\cos x \leq 0.2$ on $[0, 2\pi)$ in terms of α.

Condition or evidence	Supplied value
Original inequality	$\cos x \leq 0.2$
Input interval	$[0, 2\pi)$

Your response: ______________

Incoming: $[-2, 2]$

Solve $\sin x > \frac{\sqrt{3}}{2}$ on $[0, 2\pi]$.



Condition or evidence	Supplied value
Original inequality	$\sin x > \frac{\sqrt{3}}{2}$
Input interval	$[0, 2\pi]$

Your response: ______________

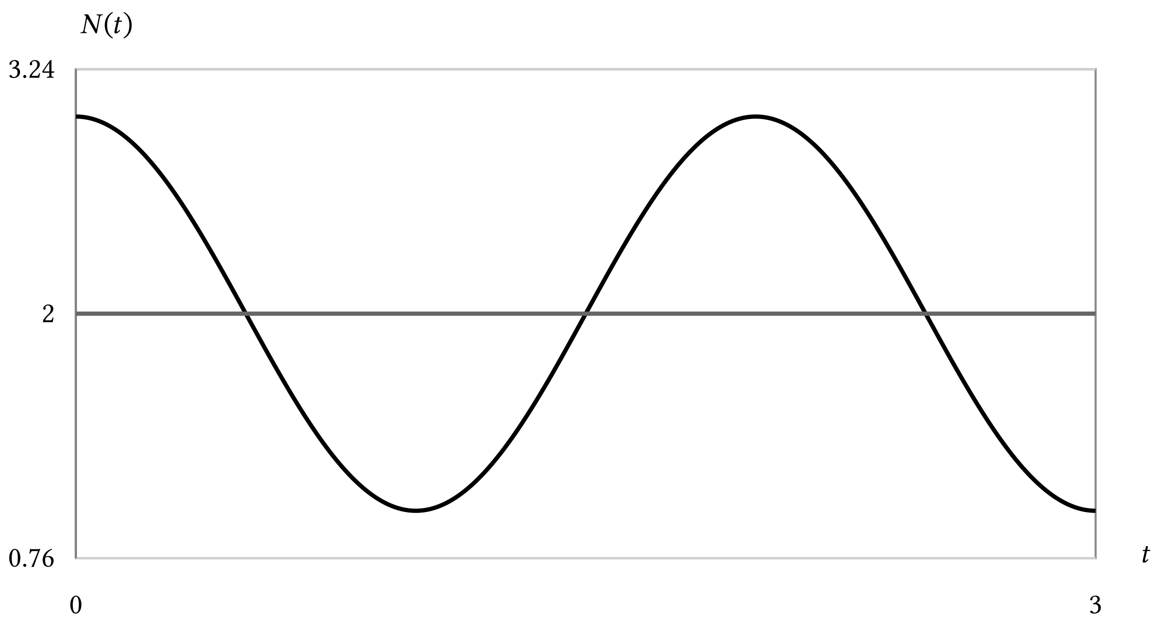
AP Precalculus

Trigonometric Inequalities

Name: ____________ **Date:** ____________ **Class:** ____________

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.

For $0 \le t \le 3, N(t) = 2 + \cos(\pi t)$. Find when $N > 2$ and add the unequal visible window lengths. First choose and justify a valid method. Method A: Add the actual lengths of the two admitted time windows. Method B: Multiply the number of windows by a common assumed length.



Condition or evidence	Supplied value
Required condition	$N > 2$
Given model	$N(t) = 2 + \cos(\pi t)$
Time interval	$[0, 3]$ hours

Trigonometric Inequalities

Full Worked Solutions - excerpt

Worked example

Problem. Determine the solution set of $\cos x > 1$ on $[0, 2\pi]$ without solving an equality first.

Determine the solution set of $\cos x > 1$ on $[0, 2\pi]$ without solving an equality first.

Condition or evidence	**Supplied value**
Original inequality	$\cos x > 1$
Input interval	$[0, 2\pi]$

Answer. $\varnothing$

Explanation and check.

Cosine's maximum value is 1, so it can never be strictly greater than 1. The solution set is empty.

Worked example

Problem. Solve $-3\sin x + 2 < -1$ on $[0, 2\pi]$, reversing the inequality when the sine term is isolated.

Solve $-3\sin x + 2 < -1$ on $[0, 2\pi]$, reversing the inequality when the sine term is isolated.

Condition or evidence	**Supplied value**
Original inequality	$-3\sin x + 2 < -1$
Input interval	$[0, 2\pi]$

Answer. $\varnothing$

Explanation and check.

Isolation gives $\sin x > 1$. Since the upper endpoint of sine's range is 1, the strict inequality is impossible.