Sets & Steps
Math Practice & Worked Solutions

Precalculus

Composition & Inverse Functions | 5-Topic Precalculus Bundle

5-topic bundle | 480 problems | Four activity formats

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01 **Composite Functions**

View individual product and its full preview

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03 **One-to-One Functions and Domain Restrictions**

View individual product and its full preview

04 **Finding Inverse Functions**

View individual product and its full preview

05 **Verifying Inverse Functions**

View individual product and its full preview

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.

40 PDFs and 5 READMEs; 500 buyer PDF pages across the 5 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
Composite Functions

Composite Functions | APPC-U02-P11

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for formulas and domains, rules and domains, rules and equality set, commutation conclusion on listed set, both composites and both ordered compositions.

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.

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AP Precalculus

Composite 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.

Read the inner table first and evaluate $f(g(0))$. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value.

Given input: 0

input	f(input)
−4	10
1	−2
5	7

input	g(input)
−2	5
0	1
3	−4

Bank label: ______

Use the tables to compare the two composition orders at $x = 1$. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value.

Given input: 1

input	f(input)
1	3
2	4
3	2
4	1

input	g(input)
1	2
2	1
3	4
4	3

Bank label: ______

AP Precalculus

Composite 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.

Determine the real domain of $f(g(x))$. The input condition is real numbers. Report interval notation and reason. Use f rule $f(u) = \frac{1}{u-4}$. Use g rule $g(x) = 2x + 1$.	Construct f composed with g. The input condition is real x. Report $f(g(x))$. Use f rule $f(u) = u^2 + 3$. Use g rule $g(x) = 2x - 1$.

AP Precalculus

Composite 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

A tank fills according to $V(t)$, and its water depth is $d(V)$. Compose the models and state the physically allowed time domain. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task. The input condition is $0 \leq t \leq 30$ minutes. Report depth as a function of time and domain. Use depth model $d(V) = \frac{V}{120}$ centimeters. Use tank capacity 540 liters. Use volume model $V(t) = 18t$ liters.

Your response: ____

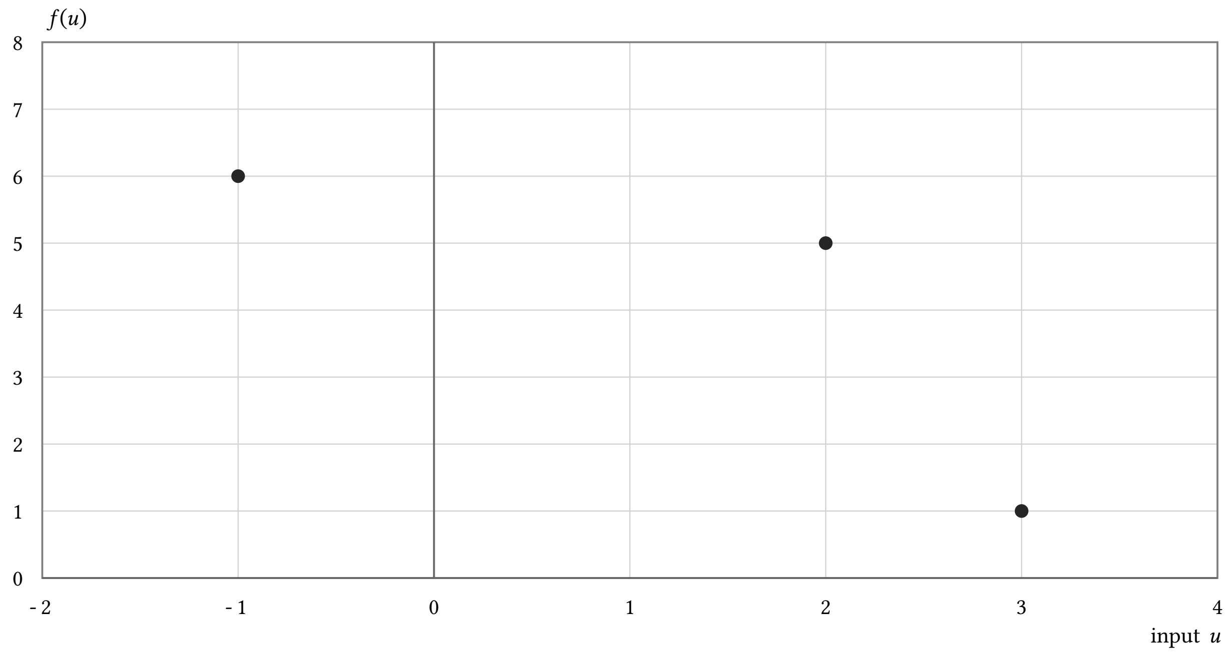
AP Precalculus

Composite 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.

Use the table for g and the point-only graph for f to find $f(g(4))$. Student work: 4 Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.



input	g(input)
1	3
2	-1
4	2

Composite Functions

Full Worked Solutions - excerpt

Worked example

Problem. Construct $f(g(x))$ without losing the inner restriction. The input condition is real x with nonnegative inner radicand. Report composite and domain. Use f rule $f(u) = 3u - 2$. Use g rule $g(x) = \sqrt{x+4}$.

Answer. $f(g(x)) = 3\sqrt{x+4} - 2$, with $x \geq -4$.

Explanation and check.

Substitute the radical for u; its radicand controls the domain.

Worked example

Problem. Find the x-intervals for each branch of $f(x^2)$. The input condition is real x. Report piecewise composite on x. Use f rule $f(u) = u + 1$ if $u < 4$; $2u$ if $u \geq 4$. Use g rule $g(x) = x^2$.

Answer. $f(x^2) = x^2 + 1$ for $-2 < x < 2$, and $2x^2$ for $x \leq -2$ or $x \geq 2$.

Explanation and check.

The inner output is below 4 exactly when $x^2 < 4$; the threshold is visited on both sides.

Sets & Steps
Math Practice & Worked Solutions

AP Precalculus
Decomposing Functions

Decomposing Functions | APPC-U02-P12

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for actual composite domains, domain-faithful decomposition, validity and domain dependence, validity and intermediate images, validity of both pairs and validity relative to H domain.

8 PDFs and a README; 87 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

Decomposing 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.

Split H at the affine expression inside the square. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value.

Use the input condition real x.

Give two nonidentity components.

Let $H(x) = (5x + 1)^2 - 7$.

Bank label: ______

Write the visible two-stage rule as $H = f$ composed with g. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value.

Use the input condition real x.

Give affine and absolute components.

Let $H(x) = |3x - 5| + 2$.

Bank label: ______

Use the prescribed outer rule to recover the missing g-values at the listed inputs. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value.

Given f rule: $f(u) = 2u + 1$

input	**H(input)**
−3	7
0	−1
4	11

Bank label: ______

List the outer pairs forced by the two aligned tables. For the answer bank, record the complete response required by the original task; use the given context to distinguish responses that share a numerical value.

Given g table:

input	**H(input)**
−6	0
0	5
2	12

input	**g(input)**
−6	3
0	−1
2	7

Bank label: ______

AP Precalculus

Decomposing 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.

Recompose both proposed pairs and decide whether each is a substantive decomposition of H.

Use the input condition real x.

Give validity of both pairs.

Let $H(x) = (x+2)^4$.

For pair A, use $g(x) = x+2$, $f(u) = u^4$.

For pair B, use $q(x) = (x+2)^2$, $p(v) = v^2$.

Recover the outer table values required for $H(x) = f(g(x))$.

Given g table:

input	H(input)
-2	7
0	2
4	9

input	g(input)
-2	1
0	3
4	5

Explain why the proposed f is not a function of its placeholder alone and repair it.

Use the input condition real x.

Give correct outer rule.

Let $H(x) = (x^2+1)^3 + 2(x^2+1)$.

The student proposes $f(u) = u^3 + 2x$.

The student proposes $g(x) = x^2 + 1$.

Construct the smallest outer table needed to express H as f after g.

Given g table:

input	H(input)
-3	6
1	-1
5	8

input	g(input)
-3	0
1	2
5	4

Find an inner rule whose reciprocal gives H, and retain every stated exclusion.

Use the input condition real x except $x = 1$ and $x = -2$.

Give inner g and domain.

Let $H(x) = \frac{x+2}{x-1}$.

Use the prescribed outer function $f(u) = \frac{1}{u}$.

Compare the recomposed rules and explain why domain declarations are part of the comparison.

Use the input condition $x \geq 0$.

Give validity relative to H domain.

Let $H(x) = x$ on $x \geq 0$.

For pair A, use $g(x) = \sqrt{x}$, $f(u) = u^2$.

For pair B, use $q(x) = x$, $p(v) = v$.

AP Precalculus

Decomposing 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

Replace the prescribed inner expression consistently to recover f. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Use the input condition real x.

Give outer polynomial.

Let $H(x) = (x-4)^3 - 2(x-4) + 6$.

Use the prescribed inner function $g(x) = x - 4$.

Your response: ________________

Incoming: $f(u) = u^3 - 2u + 6$.

Undo the outer translation to recover g. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Use the input condition real x.

Give inner function.

Let $H(x) = \sqrt{x^2+4} + 7$.

Use the prescribed outer function $f(u) = u + 7$.

Your response: ________________

Incoming: $g(x) = \sqrt{x^2+4}$.

Recover f and state the intermediate inputs on which it must be defined. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Use the input condition real x.

Give outer rule on image.

Let $H(x) = 4x^2 - 12$.

Use the prescribed inner function $g(x) = x^2$.

Your response: ________________

Incoming: $f(u) = 4u - 12$ for $u \geq 0$.

Recover the pre-tax subtotal and tax stages. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Use the input condition $0 \leq n \leq 80$ tickets.

Give subtotal and taxed-total maps.

Use the compound model $T(n) = 1.075(14n + 5)$ dollars.

Your response: ________________

Incoming: $S(n) = 14n + 5$ dollars and $T(S) = 1.075S$ dollars.

Treat the recurring logarithm as one intermediate variable. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Use the input condition $x > 0$.

Give log inner and polynomial outer.

Let $H(x) = (\ln(x))^2 - 6\ln(x) + 2$.

Your response: ________________

Incoming: $g(x) = \ln(x), x > 0$, and $f(u) = u^2 - 6u + 2$.

Remove the outer scaling to identify g. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Use the input condition real x.

Give inner rule.

Let $H(x) = \frac{3}{x^2+1}$.

Use the prescribed outer function $f(u) = 3u$.

Your response: ________________

AP Precalculus

Decomposing 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.

Check whether pulling the positive factor outside absolute value gives a second valid decomposition. Student work: Both are invalid for all real x because $|2(x+3)| = 2|x+3|$. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Use the input condition real x.

Give validity.

Let $H(x) = |2x+6|$.

For pair A, use $g(x) = 2x+6, f(u) = |u|$.

For pair B, use $q(x) = x+3, p(v) = 2|v|$.

Isolate the quadratic expression evaluated before absolute value. Student work: $g(x) = x^2 + 6x + 2$ and $f(u) = |u| + 5$. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Use the input condition real x.

Give quadratic inner and absolute outer.

Let $H(x) = |x^2 - 6x + 2| + 5$.

Decomposing Functions

Full Worked Solutions - excerpt

Worked example

Problem. Can a single f satisfy $x = f(\sin(x))$ for every real x? Give a decisive pair of inputs. Use the complete final response to identify the next Match & Move card; show the reasoning required by the original task.

Answer. No. $\sin(0) = \sin(2\pi) = 0$, but $H(0) = 0$ and $H(2\pi) = 2\pi$.

Explanation and check.

The periodic inner map discards which cycle produced the value, while H retains that information.

Worked example

Problem. Formally undo the logarithm and verify whether the resulting inner function is admissible. Student work: $g(x) = e^{-x^2}$, which is negative for every real x and satisfies $\ln(g(x)) = -x^2$. Identify the precise mathematical error or omitted condition, then complete the original task and verify the correction from the supplied givens.

Answer. $g(x) = e^{-x^2}$, which is positive for every real x and satisfies $\ln(g(x)) = -x^2$.

Explanation and check.

A logarithm may output negative values; only its input must be positive, which the exponential guarantees.

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.

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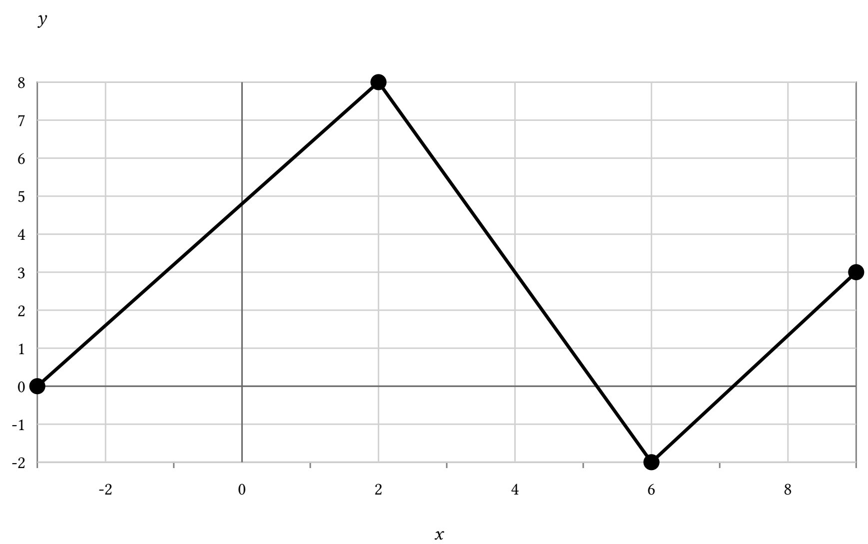
AP Precalculus

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: ______

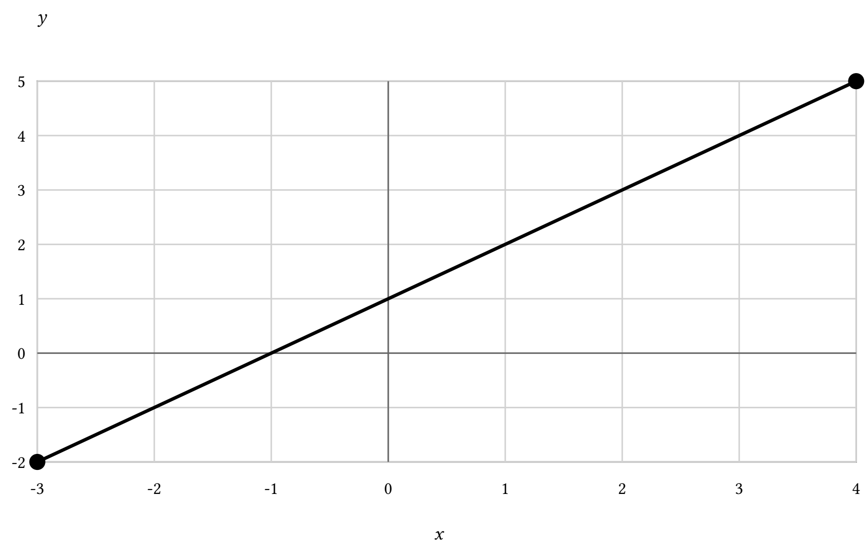
AP Precalculus

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: $0 \leq t \leq 8$ 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: $0 \le t \le 12$ 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

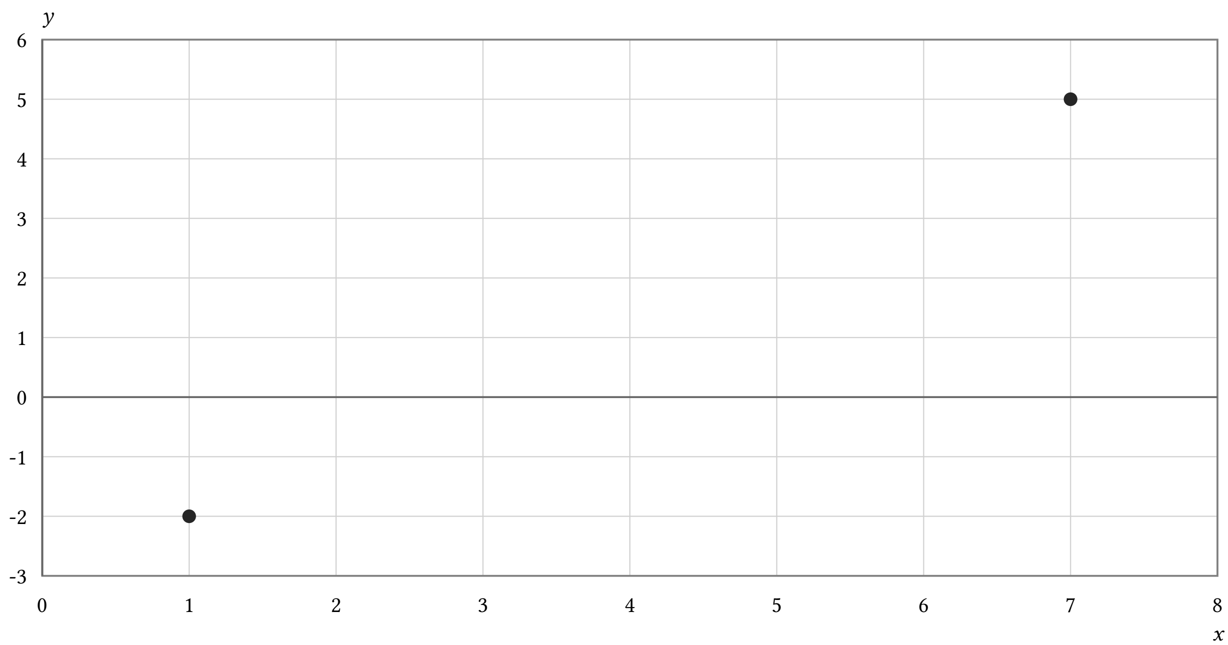
Finding Inverse Functions

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.

Published by Tusils LLC.

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: $1 \le x \le 5$; proposed g: $3 \le x \le 20$

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: $x \ge 2$; g: $x \ge 0$

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.