

Algebra 1
Interpolation and Extrapolation

Interpolation and Extrapolation | A1-U10-P12

96 problems · Four activity formats

01	Answer Bank Challenge	24 tasks
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Topic focus
Across 96 tasks this topic asks for prediction with evidential and contextual qualification.
8 PDFs and a README; 57 buyer pages.

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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.

The fitted linear model is $\hat{y} = 3x + 5$; x is measured in weeks, $\hat{y}$-hat in centimeters, and observed inputs span 0 to 10. Predict at $x = 10$, report according to nearest centimeter, and identify whether the result is modeled or observed and whether the input is interpolation or extrapolation. _____ Bank label: _____	The fitted linear model is $\hat{y} = -2x + 78$; x is measured in minutes, $\hat{y}$-hat in degrees Celsius, and observed inputs span 0 to 15. Predict at $x = 9$, report according to nearest degree, and identify whether the result is modeled or observed and whether the input is interpolation or extrapolation. _____ Bank label: _____
The fitted linear model is $\hat{y} = 14$; x is measured in filter setting, $\hat{y}$-hat in clarity units, and observed inputs span 1 to 9. Predict at $x = 7$, report according to nearest unit, and identify whether the result is modeled or observed and whether the input is interpolation or extrapolation. _____ Bank label: _____	The fitted linear model is $\hat{y} = 1.5x + 4$; x is measured in hours, $\hat{y}$-hat in kilometers, and observed inputs span 0 to 8. Predict at $x = 4.5$, report according to nearest tenth, and identify whether the result is modeled or observed and whether the input is interpolation or extrapolation. _____ Bank label: _____
The fitted linear model is $\hat{y} = 5x - 3$; x is measured in liters, $\hat{y}$-hat in yield kilograms, and observed inputs span 1 to 8. Predict at $x = 4$, report according to nearest kilogram, and identify whether the result is modeled or observed and whether the input is interpolation or extrapolation. _____ Bank label: _____	The fitted linear model is $\hat{y} = 1.4x + 8$; x is measured in kilometers, $\hat{y}$-hat in fuel liters, and observed inputs span 0 to 10. Predict at $x = 5$, report according to nearest tenth, and identify whether the result is modeled or observed and whether the input is interpolation or extrapolation. _____ Bank label: _____
The fitted linear model is $\hat{y} = 4x + 11$; x is measured in advertising blocks, $\hat{y}$-hat in expected orders, and observed inputs span 0 to 12. Predict at $x = 8$, report according to nearest whole expected order, and identify whether the result is modeled or observed and whether the input is interpolation or extrapolation. _____ Bank label: _____	The fitted linear model is $\hat{y} = -3x + 20$; x is measured in signed position meters, $\hat{y}$-hat in signal units, and observed inputs span -5 to 5. Predict at $x = -2$, report according to nearest unit, and identify whether the result is modeled or observed and whether the input is interpolation or extrapolation. _____ 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. A value without its unit is not a complete answer.

The fitted linear model is $\hat{y} = 2x + 4$; x is measured in miles, $\hat{y}$ in dollars, and observed inputs span 0 to 12. Predict at $x = 6$, report according to nearest cent, and identify whether the result is modeled or observed and whether the input is interpolation or extrapolation. 	A table has four evenly spread observations and asks about an unlisted middle input. Observed explanatory inputs are 1, 3, 5, 7; the model is requested at $x = 4$. Classify from actual observations and qualify gaps or endpoints.
The request uses the first recorded input in a four-row table. Observed explanatory inputs are 0, 2, 6, 9; the model is requested at $x = 0$. Classify from actual observations and qualify gaps or endpoints. 	The target matches the last recorded input rather than extending past it. Observed explanatory inputs are 2, 4, 8, 10; the model is requested at $x = 10$. Classify from actual observations and qualify gaps or endpoints.
A requested input sits one unit above every measured setting. Observed explanatory inputs are 1, 2, 5, 8; the model is requested at $x = 9$. Classify from actual observations and qualify gaps or endpoints. 	The model is queried two units below the earliest recorded setting. Observed explanatory inputs are 3, 5, 7, 11; the model is requested at $x = 1$. Classify from actual observations and qualify gaps or endpoints.

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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: reason: Currency reporting uses cents and ordinary rounding.; report: \$27.39 A fitted model produces 12.746 cm. The output represents measured length estimate. Reporting rule: nearest tenth centimeter. Choose the defensible final report and explain why calculator digits, discreteness, or threshold logic require that form. Your response: _____	Incoming: estimated input: 5; reason: Solving $4x + 10 = 30$ gives $x = 5$, inside the observed range.; status: supported A fractional slope must be undone before checking support. The fitted linear model is $\hat{y} = 1.5x + 4$, observed for inputs 0 through 8. Estimate the input for fitted response 13, then check uniqueness, support, and feasibility. Your response: _____
Incoming: estimated input: 3.5; reason: The solution $x = 3.5$ is not a whole number of machines.; status: contextually inadmissible Elapsed time is continuous, so a fractional inverse can be meaningful. The fitted linear model is $\hat{y} = 8x + 2$, observed for inputs 0 through 4. Estimate the input for fitted response 17, then check uniqueness, support, and feasibility. Your response: _____	Incoming: estimated input: 12; reason: The exact inverse $x = 12$ lies beyond the observed range; report the estimate with a support warning.; status: extrapolated input A continuous inverse falls between two feasible machine counts. The fitted linear model is $\hat{y} = 5x + 8$, observed for inputs 0 through 10. Estimate the input for fitted response 40, then check uniqueness, support, and feasibility. Your response: _____
Incoming: estimated input: $\frac{29}{7}$; reason: The exact solution $x = \frac{29}{7}$ lies within the observed range.; status: supported The explanatory coordinate explicitly permits negative positions. The fitted linear model is $\hat{y} = -4x + 10$, observed for inputs -5 through 5. Estimate the input for fitted response 22, then check uniqueness, support, and feasibility. Your response: _____	START The fitted exponential model is $\hat{y} = 40(0.75)^x$; x is measured in cycles, $\hat{y}$-hat in remaining capacity percent, and observed inputs span 0 to 5. Predict at $x = 8$, report according to nearest tenth percent, and identify whether the result is modeled or observed and whether the input is interpolation or extrapolation. 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.

The fitted model is $\hat{y} = 3x + 10$, and a request uses $x = -2$. Context restriction: participants must be nonnegative whole numbers. Compute the algebraic model value, then decide whether it is a usable contextual prediction; if not, name the exact input or output restriction that fails.

The fitted model is $\hat{y} = 4x + 12$, and a request uses $x = -3$. Context restriction: signed positions from -5 to 5 are allowed. Compute the algebraic model value, then decide whether it is a usable contextual prediction; if not, name the exact input or output restriction that fails.

The fitted model is $\hat{y} = \frac{1}{10}x + 0.6$, and a request uses $x = 5$. Context restriction: probability outputs must lie from 0 to 1 . Compute the algebraic model value, then decide whether it is a usable contextual prediction; if not, name the exact input or output restriction that fails.

The fitted model is $\hat{y} = -\frac{1}{5}x + 0.5$, and a request uses $x = 4$. Context restriction: probability outputs must lie from 0 to 1 . Compute the algebraic model value, then decide whether it is a usable contextual prediction; if not, name the exact input or output restriction that fails.

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Full Worked Solutions - excerpt

Worked example

Problem. A fitted model produces 18.64 people. The output represents expected attendance. Reporting rule: nearest tenth. Choose the defensible final report and explain why calculator digits, discreteness, or threshold logic require that form.

Answer. reason: A mean count may be fractional, so do not force it to an individual count.; report: 18.6 people expected

Explanation and check.

Report: 18.6 people expected. A mean count may be fractional, so do not force it to an individual count.

Worked example

Problem. A score target is sought from a positively sloped practice model. The fitted linear model is $\hat{y} = 4x + 10$, observed for inputs 0 through 10. Estimate the input for fitted response 30, then check uniqueness, support, and feasibility.

Answer. estimated input: 5; reason: Solving $4x + 10 = 30$ gives $x = 5$, inside the observed range.; status: supported

Explanation and check.

Reverse use gives input 5. Status: supported. Solving $4x + 10 = 30$ gives $x = 5$, inside the observed range.