AP PRECALCULUS • 1.1 CHANGE IN TANDEM • VERSION A

Name: _____ Date: _____ Period: _____

1. Is each relation a function? Explain why or why not.

A. Table: x: 2, 4, 6, 8 y: 5, 8, 8, 11.

B. Equation: $2y - 3x^2 + 10 = 0$.

C. Mapping: employee → badge number: Ana→812, Bo→922, Cy→732.

D. Equation: $x^2 + y^2 = 29$. Decide whether y is a function of x.

2. Identify dependent and independent variables in context.

A. The rule b(h) gives the height b of a first bounce when a ball is dropped from height h. Identify each variable.

B. The rule T(n) gives ticket revenue T from n tickets sold for $22 per ticket. Identify each variable.

C. A graph has "hours practiced" on the horizontal axis and "quiz score" on the vertical axis. Identify each variable and explain your choice.

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3. Evaluate expressions using function notation.

Let $f(x) = 2x^2 + 6x - 9$. Find: A. $f(-2)$ B. $-f(x)$ C. $f(3x)$.

Let $g(x) = |x - 1| - 5$. Find: D. $g(-x)$ E. $g(x - 2)$ F. $g(2x)$.

4. Find an unknown coefficient; write real-world function rules.

A. If $F(x)=2x^3+Bx^2+3x-5$ and $F(2)=25$, find B.

B. A person earns \$22 per hour. Write $S(t)$ for gross pay after t hours.

C. Express the area of a square A as a function of its perimeter P.

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5. Increasing, decreasing, and constant behavior from rules and a table.

A. x: 2, 3, 5, 8, 12 f(x): 7, 9, 10, 13, 16. Is f increasing or decreasing? Justify.

B. State where $y=(x-1)^{2/3}$ is increasing and decreasing.

C. State where $y=4$ is increasing, decreasing, or constant.

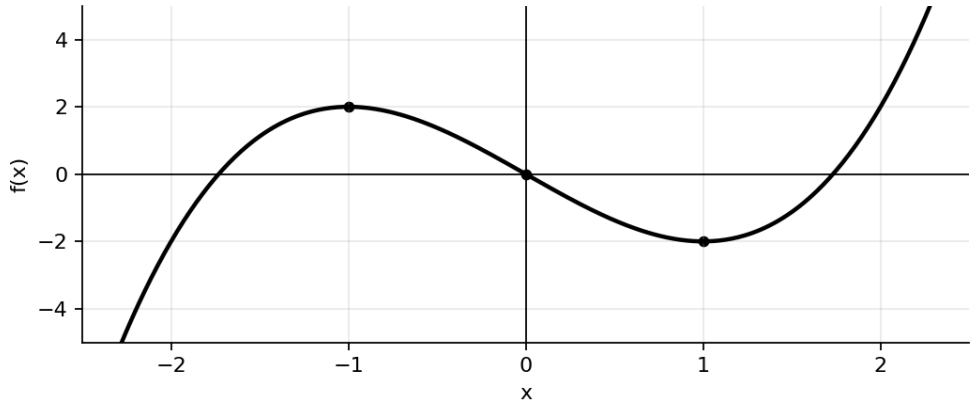
D. State where $y=|x-1|+|x+7|$ is increasing, decreasing, or constant.

6. Analyze increasing/decreasing, concavity, and intercepts from a cubic graph.

The graph shows $f(x)=(x-(0))^3-3(x-(0))$. Answer using open intervals:

A. Increasing? B. Decreasing? C. Concave up? D. Concave down?

E. Give the turning points and the inflection point. F. Find the y-intercept.



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7. Interpret sign, direction, and changing rate on a periodic graph.

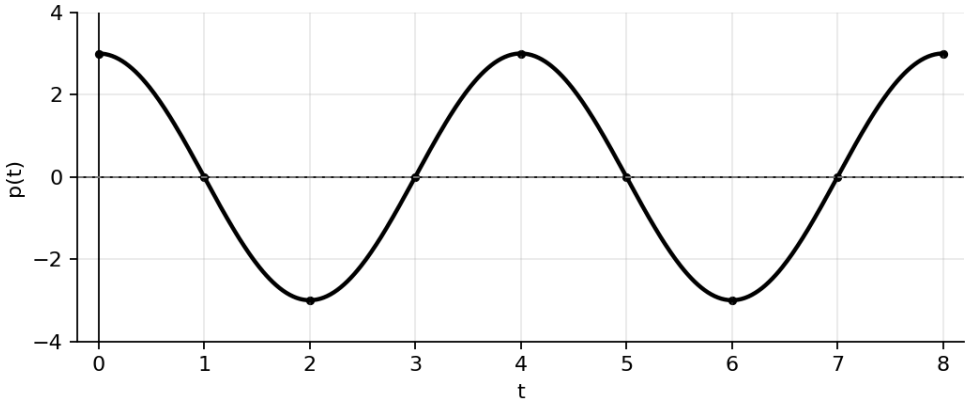
The periodic graph is $p(t)=3\cos(\pi t/2)$, with t from 0 to 8.

A. On (2,3), is p positive/negative and increasing/decreasing?

B. On (2,3), is its rate of change increasing or decreasing? Explain using the graph.

C. Give one interval where p is positive and decreasing and one where it is negative and increasing.

D. State the maximum, minimum, midline, and period.



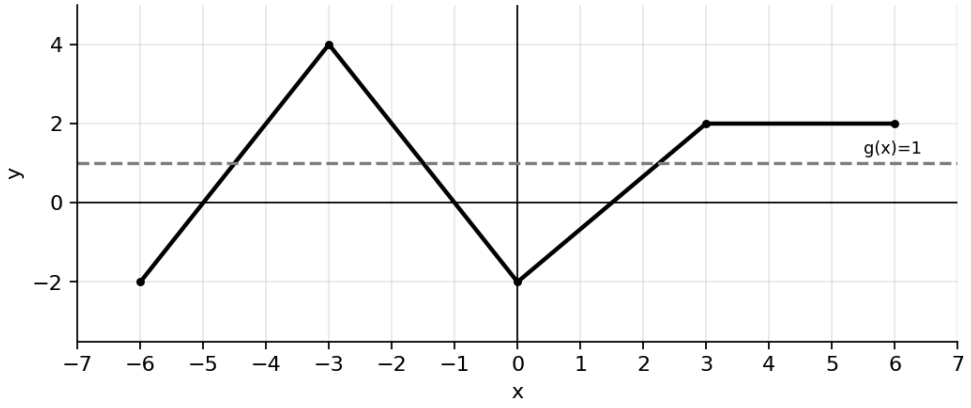
8. Use a piecewise graph to compare two functions and analyze features.

The solid graph is f. Its vertices are at (-6,−2), (-3,4), (0,−2), (3,2), (6,2); dashed g(x)=1.

A. Give intervals where f increases, decreases, and remains constant.

B. Find the x- and y-intercepts of f; list its highest and lowest values.

C. Solve f(x)=g(x); state where f(x)>g(x).



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9. Evaluate and solve equations involving a quadratic function.

Let $f(x)=2(x-(1))^2-8$. A. Find $f(4)$; interpret the point on its graph.

B. Find $f(0)$. C. Solve $f(x)=-6$; explain what the solutions mean graphically.

D. Find the zeros; state the vertex and axis of symmetry.

E. Explain the difference between evaluating $f(a)$ and solving $f(x)=a$.

10. Create and analyze graphs for two real-world situations.

A. Speed: A vehicle starts at 36 mph, reaches 54 mph after 6 s, holds that speed 4 s, then slows uniformly to rest over 6 s.

Draw speed vs. time; state domain/range; write the constant-speed equation.

B. Distance: A student walks 3 blocks from home in 4 min, returns home in 2 min, waits 2 min, then walks 5 blocks to school in 10 min and waits 3 min.

Draw distance vs. time; state domain/range and all increasing/decreasing/constant intervals.

