CheggSolutions - Thegdp

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## Trigonometric Functions and Graphs

### Step-by-Step Solution

**Step 1: Identify the Pattern**

Examine the given graph for key features such as amplitude, period, phase shift, and vertical shift.

*Supporting Statement: The graph appears to represent a trigonometric function, likely a sine or cosine function, with specific modifications.*

**Step 2: Determine the Trigonometric Function**

To match the given graph, first consider the base function. The graph resembles a sine wave but with variations in amplitude and possibly a vertical shift.

*Supporting Statement: Pattern identification is crucial, which allows for distinguishing between sine and cosine.*

**Step 3: Calculate the Amplitude**

The amplitude is the height from the midline to the peak of the wave. Here, the graph reaches a maximum y-value of approximately 2 and a minimum y-value of -2, suggesting an amplitude of 2.

*Supporting Statement: Amplitude is found by calculating the distance between the peak and the midline of the wave.*

$$ \text{Amplitude} = 2 $$

**Step 4: Determine the Period**

The period of the sine function is the length of one complete cycle of the wave. By examining the graph, it appears the wave completes one cycle every $4\pi$.

*Supporting Statement: Correctly determining the period allows setting up the equation accurately.*

$$ \text{Period} = 4\pi $$

**Step 5: Find the Vertical Shift**

The graph oscillates around the line $y=0$; hence, the vertical shift is 0.

*Supporting Statement: Identification of vertical shift gives the equation's midline.*

$$ \text{Vertical Shift} = 0 $$

**Step 6: Identify Phase Shift**

The wave appears to start from $y=0$ when $x=0$, therefore, no horizontal phase shift is present.

*Supporting Statement: Phase shift adjusts the horizontal movement of the graph; lacking a shift means it starts from the origin.*

$$ \text{Phase Shift} = 0 $$

**Step 7: Write the Function**

Using the standard form $y = a \sin(bx - c) + d$:

> *a (amplitude) = 2*
> *b (frequency factor) = $\frac{2\pi}{\text{Period}} = \frac{2\pi}{4\pi} = \frac{1}{2}$*
> *c (phase shift) = 0*
> *d (vertical shift) = 0*
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Supporting Statement: Combining all characteristics found, the function `y = 2 \sin\left(\frac{x}{2}\right)` *matches the provided pattern.*

Final Solution: \[y = 2 \sin\left(\frac{x}{2}\right) \]

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