What should the minimum wage be today?

Minimum wage in America isn't as old as you might think—the first federal minimum wage was introduced in 1938 under Franklin Delano Roosevelt at 25 cents an hour, roughly $4 today. It was created as part of the Fair Labor Standards Act (FLSA), which also established standards for youth employment, overtime pay, recordkeeping, and government employees at every level.

Since its introduction, the federal minimum wage has been raised 22 times by 12 different presidents, but it has remained at $7.25 since 2009. While many states have opted for higher minimums, the federal rate does not automatically rise with inflation; only Congress can increase it. Without congressional action over the years, today's minimum wage would still be just 25 cents an hour.

In this activity, we'll explore the history of the U.S. minimum wage and analyze the data to build a model that predicts what an appropriate minimum wage would be today.
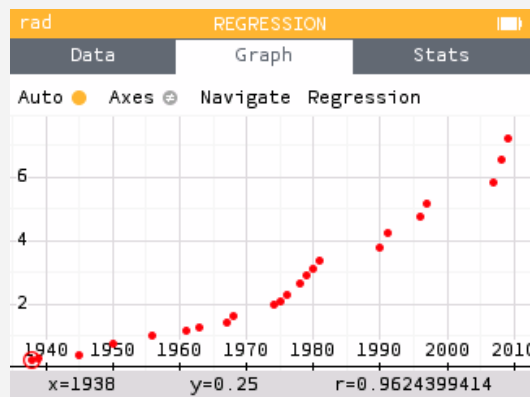*Source: https://bebusinessed.com/history/history-of-minimum-wage*

Data

Below is a table of the federal minimum hourly wage level and the year it went into effect.

Year	Wage	Year	Wage	Year	Wage
1938	$0.25	1968	$1.60	1990	$3.80
1939	$0.30	1974	$2.00	1991	$4.25
1945	$0.40	1975	$2.10	1996	$4.75
1950	$0.75	1976	$2.30	1997	$5.15
1956	$1.00	1978	$2.65	2007	$5.85
1961	$1.15	1979	$2.90	2008	$6.55
1963	$1.25	1980	$3.10	2009	$7.25
1967	$1.40	1981	$3.35		

Source: US Department of Labor
Saved simulator session: https://my.numworks.com/simulators/1ydeABx

1. Create a scatter plot of the data set. What is the correlation coefficient? What does the correlation coefficient tell us about the relationship between years and wages?

$r \approx 0.962$
There is a strong positive correlation between years and wages.

2. Use your calculator to create a linear regression model.

$\widehat{y} =- 181.5867 + 0.09334756x$
Or $\widehat{y} = 0.09334756x - 181.5867$

3. What does the slope of your model mean in the context of this situation?

The model suggests that the minimum wage increases by about 9 cents each year.

4. The US Department of Labor data indicates that the minimum wage reached $2.10 in 1975. According to the model, what should the minimum wage have been in 1975?

In 1975, the model estimates the minimum wage to have been $2.77

5. The US Department of Labor data indicates that the minimum wage reached $5.15 in 1997. According to your model, in what year should the minimum wage have reached $5.00?

The model reaches a predicted value of $5.00 within the year 1998, or by 1999.

6. The US Department of Labor data indicates that the minimum wage reached $1.00 in 1956. According to your model, what should the minimum wage have been in 1956?

The model predicted the minimum wage in 1956 to be $1.00

7. According to your model, in what year should the minimum wage have been $0?

The model reaches a predicted value of $0 within the year 1945, or by 1946.

8. Review the model predictions from questions 4 - 7. How would you explain the differences between the actual data and your predictions from the model?

Answers will vary.

9. According to the US Department of Labor data, what was the average rate of change for the minimum wage from 1938 to 1974? What does this value mean in the context of the problem?

$\frac{\$2.00 - \$0.25}{1974 - 1938} \approx 0.05$

On average, the minimum wage increased 5 cents per year from 1938 to 1974

10. According to the US Department of Labor data, what was the average rate of change from 1974 to 2009?
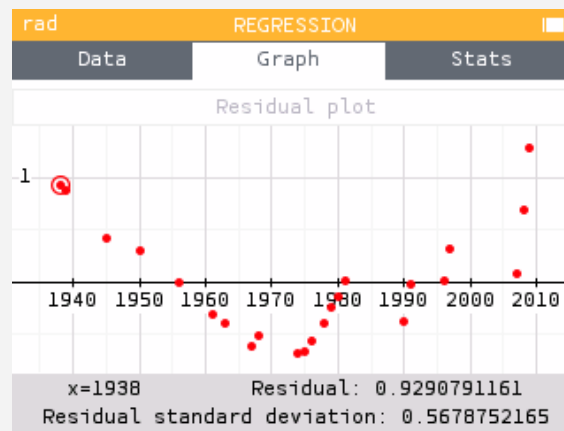
$\frac{\$7.25 - \$2.00}{2009 - 1974} = 0.15$

On average, the minimum wage increased 15 cents per year from 1974 to 2009.

11. How do these values compare to the slope of your model? What might that tell you about your model?

The slope of the model, 0.09 cents per year is a greater rate than the actual average rate of change from 1938 to 1974. However the slope of the model is less than the actual average rate of change from 1974 to 2009. This could tell us that the model may not be the best fit of the data. This could tell us that a better model could be one that has an increasing rate of change.

Extension

Describe the Residual plot of your linear model. What does it indicate about the model?

The residual plot has a slight curved pattern, implying that a curved model may be best.

Would you choose a different model to better fit the data? If so, what model would you use?

Answers may vary.
Quadratic: