MTHSC 102 Section 4.3 – Inflection Points

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Definition

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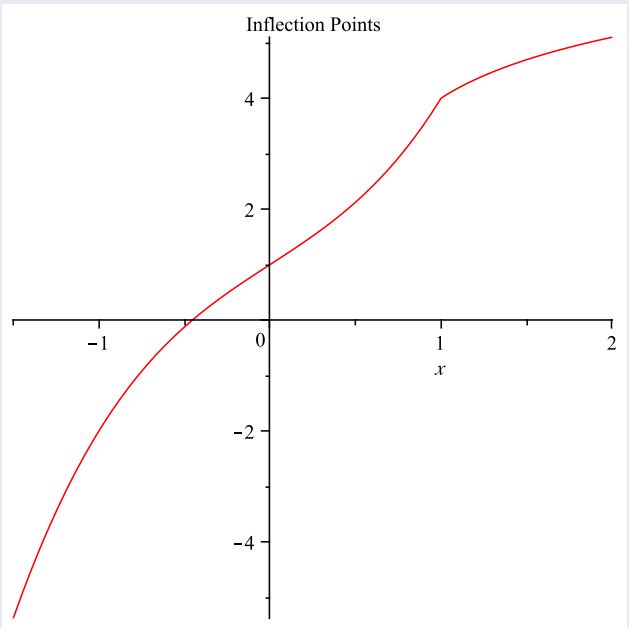
Example

Consider the graph



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- That is, they occur at the locations of the relative extreme values of the derivative $f'(x)$.
- The relative extremes of the derivative will occur at the places where the 2nd derivative $f''(x)$ is either 0 or undefined.
- If the 2nd derivative $f''(x)$ is negative on one side of an input value and positive on the other side of that input value, then an inflection point of the function graph occurs at that input value.

Example

The percentage of students graduating from high school in SC from 1982 through 1990 who entered postsecondary institutions can be modeled by

$$f(x) = -0.1057x^3 + 1.355x^2 - 3.672x + 50.792 \quad \%,$$

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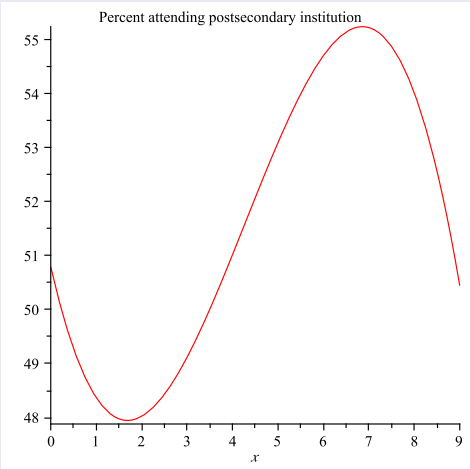

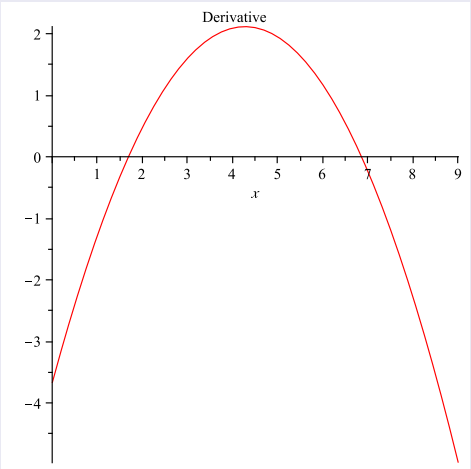

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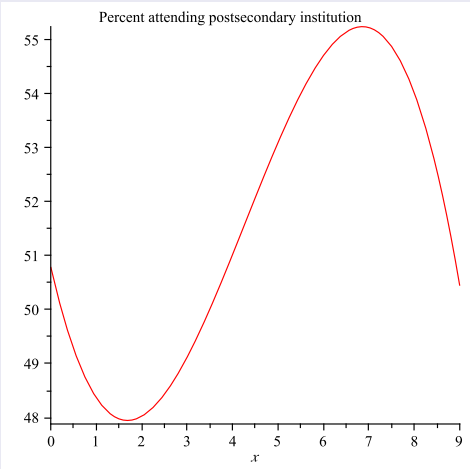
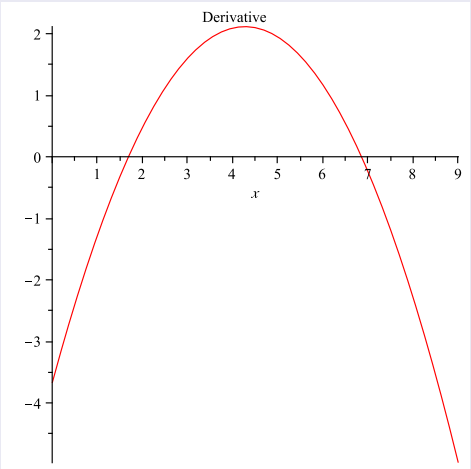
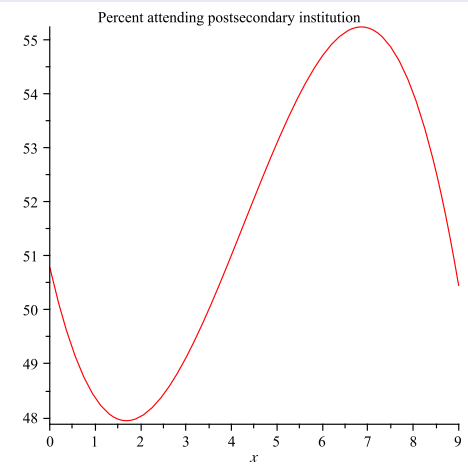


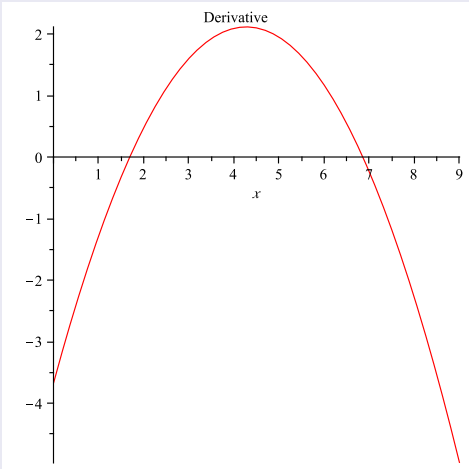


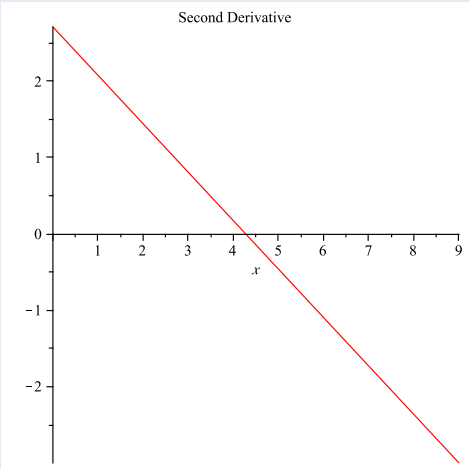
1. Find the inflection point of the function.
2. Determine the year between 1982 and 1990 in which the percentage was increasing most rapidly.
3. Determine the year between 1982 and 1990 in which the percentage was decreasing most rapidly.

Example

Consider again the function from the previous example and its 1st and 2nd derivatives.







Fact

- *In regions where the 2nd derivative is negative, the graph of the function is concave down.*
- *In regions where the 2nd derivative is positive, the graph of the function is concave up.*