1. A company has the given demand function: $p = -0.02x + 600$

A. Find the revenue function.

Recall: $R(x) = px$

B. Use the marginal revenue function to approximate the revenue realized from the sale of the 234th unit.

Command: Answer:

2. A music company produces a variety of electric guitars. The total cost of producing x guitars is given by the function $C(x) = 6100 + 7x - \frac{1}{5}x^2$ where $C(x)$ is given in dollars.

Find the average cost of producing 130 guitars.

Recall: $\overline{C(x)} = \dfrac{C(x)}{x}$

Demand is said to be **elastic** if $E(p) > 1$.
Demand is said to be **unitary** if $E(p) = 1$.
Demand is said to be **inelastic** if $E(p) < 1$.

3. Suppose the demand equation of a product is given by $p = -0.04x + 1000$ where the function gives the unit price in dollars when x units are demanded. Compute $E(p)$ when $p = \$535$ and interpret the results.

Recall: $E(p) = -\dfrac{p \cdot f'(p)}{f(p)}$

4. During a flu epidemic, the total number of students on a certain college campus who had contracted influenza by the tth day was given by $N(t) = \dfrac{3000}{1+99e^{-t}}$, where $t \geq 0$. How many students contracted influenza by the 3rd day?

Command: Answer:

5. At the beginning of an experiment, a researcher has 511 grams of a substance. If the half-life of the substance is 16 days, what is the rate of change after 10 days?
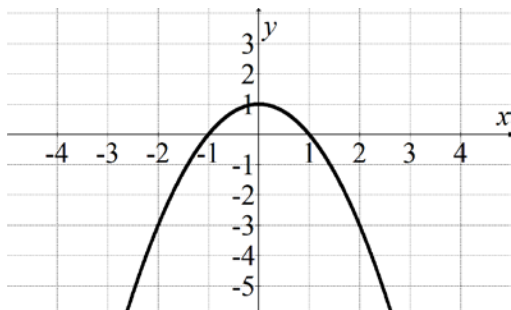
Command: Answer:

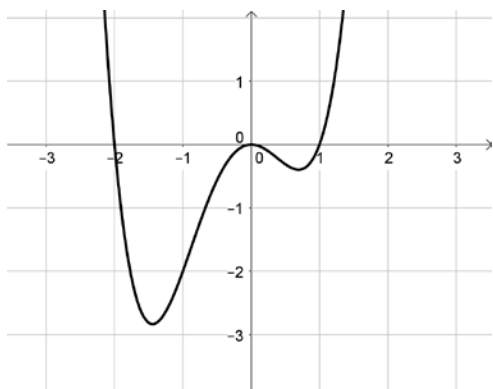6. The graph given below is the *first derivative* of a function, f.
A. Find any critical numbers of f.

B. Find where f is increasing/decreasing and any relative extrema.

7. The graph given below is the *second derivative* of a polynomial function, *f*.
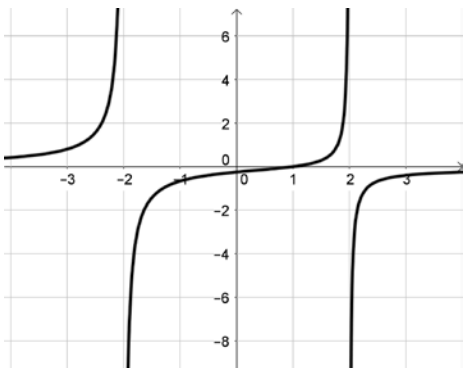A. Find any intervals of concavity.
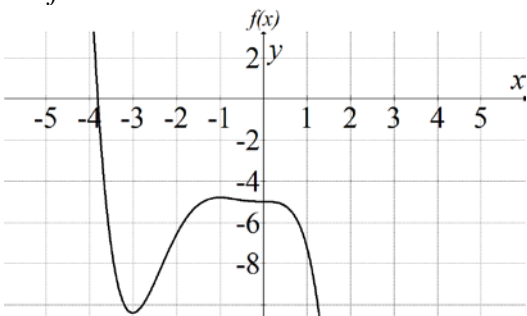

B. Find any points of inflection.

8. The graph below is the graph of *f '* of a function *f* whose domain is all real numbers except -1 and 1. Find any critical numbers, any intervals of increase/decrease of *f* and any relative extrema of *f*.
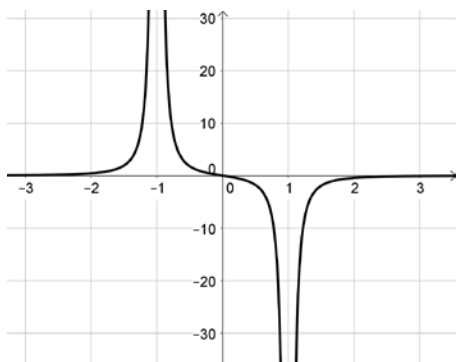
9. The graph below is the graph of f'' of a function f whose domain is all real numbers except -2 and 2. Find any intervals of concavity of f and any points of inflection of f.


10. Let $f(x) = -0.2x^5 - x^4 - x^3 - 5$. Find any critical numbers, any relative extrema, intervals of increase/decrease, any intervals of concavity, and any points of inflection. *Enter the function in GGB.*

Commands: Answers:

11. Let $f(x) = -27x^2 + \dfrac{2}{x} - 2$. Find any critical numbers, any relative extrema, intervals of increase/decrease, any intervals of concavity, and any points of inflection.

Enter the function in GGB.
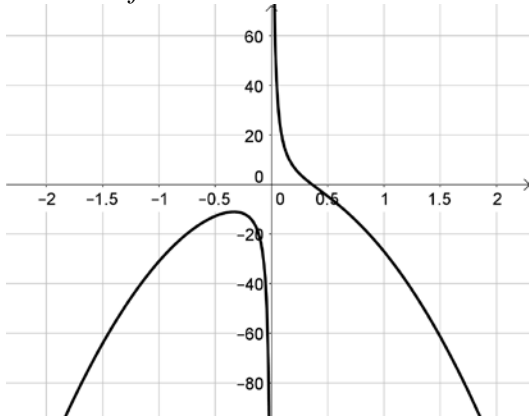
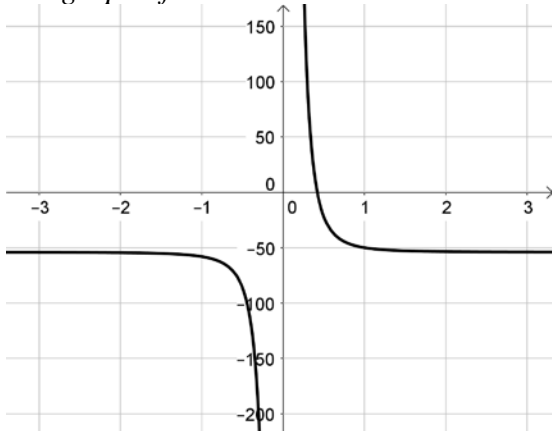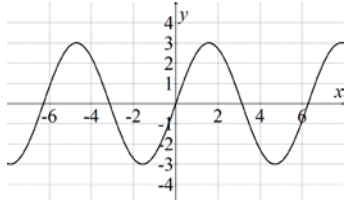Commands: Answers:

The graph of the second derivative is shown below.

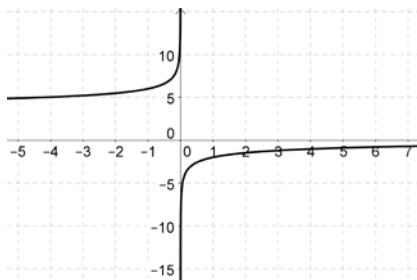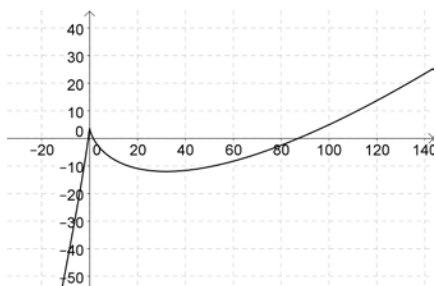12. Find the absolute maximum and absolute minimum of this function.

Abs Max: Abs Min:

13. Find the absolute extremum of the function $f(x) = 2x - 5x^{4/5} + 4$ on [-1, 4]. *Enter the function in GGB, find its domain then find the function's derivative.*

$$f(x) \qquad\qquad\qquad\qquad f'(x)$$


Commands: Answers:

14. An open box has a square base and a volume of 500 in³. Find the dimensions of the box, assuming a minimum amount of material is used in its construction. Determine the function that describes the situation, and write it in terms of one variable (usually x).

15. A rectangular playground is to be fenced off and divided into two parts by a fence parallel to one side of the playground. Six hundred feet of fencing is used.

Determine the function that describes the situation, and write it in terms of one variable (usually x).
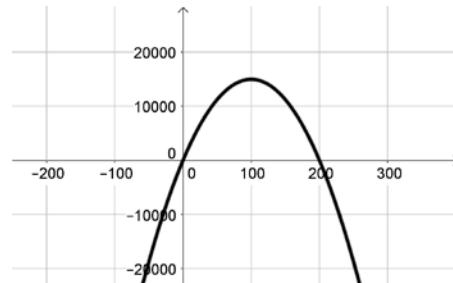
Find the dimensions of the playground that will enclose the greatest total area. What is the maximum area?
Command: Answer: