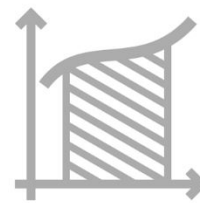


# Workbook



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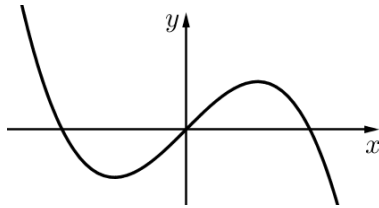
# Graphs of a Function and its Derivative

## Graphs of a Function and its Derivative

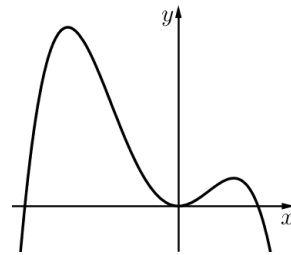
### Example Questions:

Given the graph of  $y = f(x)$ , sketch the graph of  $y = f'(x)$ :

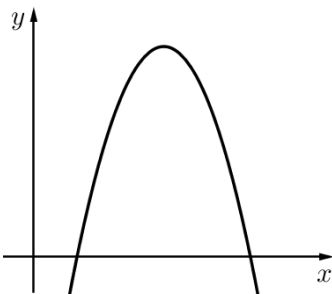
1)



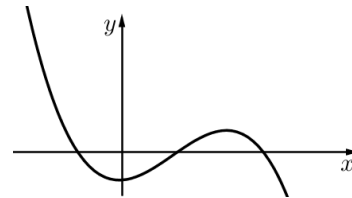
2)



3)

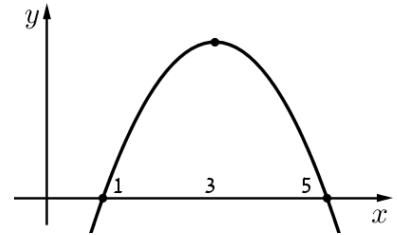


4)

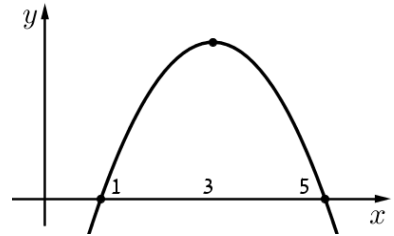


**Exercises Questions:**

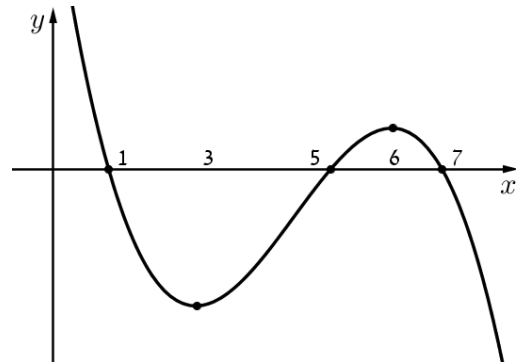
- 1) Given the graph of  $y = f'(x)$
- Find all local extrema point of function  $y = f(x)$ .
  - Determine the intervals where the function  $y = f(x)$  is increasing and where it is decreasing.



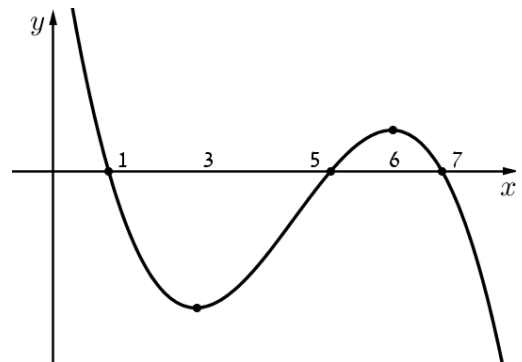
- 2) Given the graph of  $y = f'(x)$
- Find the inflection points of the function  $y = f(x)$ .
  - Determine the intervals where the function is concave up and where it is concave down.



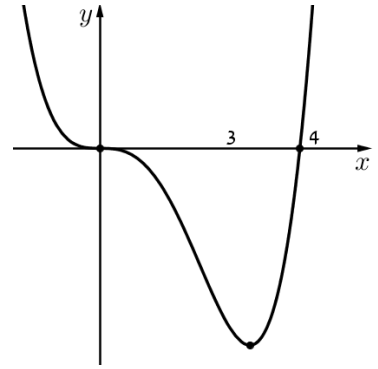
- 3) Given the graph of  $y = f'(x)$
- Find all local extrema point of function  $y = f(x)$ .
  - Determine the intervals where the function  $y = f(x)$  is increasing and where it is decreasing.



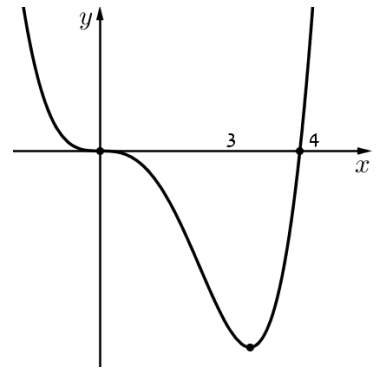
- 4) Given the graph of  $y = f'(x)$
- Find all local extrema point of function  $y = f(x)$ .
  - Determine the intervals where the function  $y = f(x)$  is increasing and where it is decreasing.



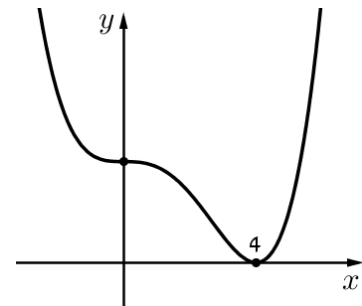
- 5) Given the graph of  $y = f'(x)$
- Find all local extrema point of function  $y = f(x)$ .
  - Determine the intervals where the function  $y = f(x)$  is increasing and where it is decreasing.



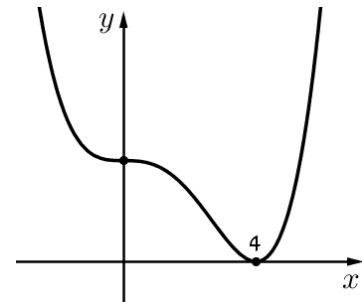
- 6) Given the graph of  $y = f'(x)$
- Find the inflection points of the function  $y = f(x)$ .
  - Determine the intervals where the function is concave up and where it is concave down.



- 7) Given the graph of  $y = f'(x)$
- Find all local extrema point of function  $y = f(x)$ .
  - Determine the intervals where the function  $y = f(x)$  is increasing and where it is decreasing.



- 8) Given the graph of  $y = f'(x)$
- Find the inflection points of the function  $y = f(x)$ .
  - Determine the intervals where the function is concave up and where it is concave down.



**Answer Key:**

- 1) a. Min:  $x=1$     max:  $x=5$                       b. Increase:  $1 < x < 5$     decrease:  $x < 1$      $x > 5$
- 2) a. Inf:  $x=3$     b. Up:  $x < 3$     down:  $x > 3$
- 3) a. Min:  $x=5$     max:  $x=1; x=7$   
b. Increase:  $x < 1$  or  $5 < x < 7$     decrease:  $0 < x < 5$  or  $x > 7$
- 4) a. Inf:  $x=3; x=6$                                       b. Up:  $5 < x < 6$                       down:  $x < 3$  or  $x > 6$
- 5) a. Min:  $x=4$     max:  $x=0$                                       b. Increase:  $x < 0$  or  $x > 4$
- 6) a. Inf:  $x=3$     b. Up:  $x > 3$     down:  $x < 3$
- 7) a. No extrema  
b. No decreasing, decreasing everywhere for all  $x$      $-\infty < x < \infty$      $x \in (-\infty, \infty)$
- 8) a. Inf:  $x=4$     b. Up:  $x > 4$     down:  $x < 4$