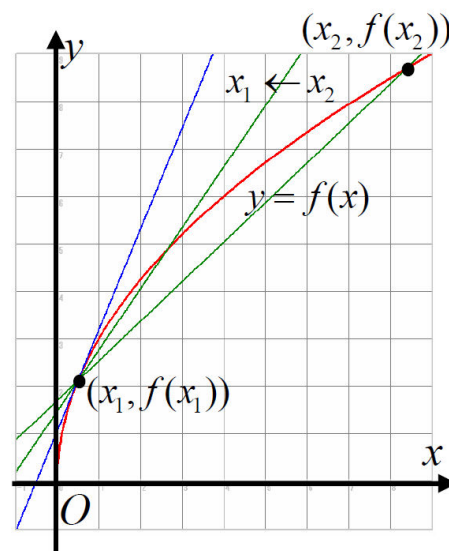


## 4期生数学サブゼミテスト⑧

About 30 minutes

### NOTICE

- 1 All the numbers in this test are real number, if there is no notice.
- 2 Hurry up as fast as possible.
- 3 If you have any questions, raise your hand quietly and let officer know.
- 4 You can use pencil and ruler.
- 5 You must answer on “answer sheet” differentiated from “question sheet”. If you answer on “question sheet”, you will get no score with the answers.
- 6 Write your name at the top space on the answer sheet.
- 7 You can also get some scores from the process of answering.  
In other word, you must write the process.



What value are these?

1. What is the signification of the derivation definition:  

$$\frac{d}{dx} f(x) \equiv \lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$$
 ? Refer to the right graph.
2. What does it tell us about the function whether the slope of the tangent line along a function is plus or not?
3. What is the signification of the second derivative?
4. Define “differentiable function”.
5. Are the following functions ( $x \rightarrow y$ ) differentiable in respect to  $x$  at these points?  
 Verify and tell the reasons by the algebra and the graph on each function.

①  $y = x^2$  at  $(0,0)$     ②  $y = |x-1|$  at  $(1,0)$

③  $y = \begin{cases} 2 & (x \geq 0) \\ -x^2 + 2 & (x < 0) \end{cases}$  at  $(0,2)$     ④  $y = \begin{cases} x^2 - 8x + 14 & (x \geq 2) \\ x^2 - 2 & (x < 2) \end{cases}$  at  $(2,2)$

6. Define differentiation.

Good Luck!