４期生数学サブゼミテスト⑯

About 40 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.

Answer in Japanese or English.

1. Differentiate these functions with respect to x.

(1) $y=\ln x$ (2) $y=\ln\left\{\sqrt{x^2}(2x-1)\right\}$ (3) $y=\ln(\sqrt{x}-1)$
(4) $y=\ln f(x)$ (5) $y=e^x$ (6) $y=a^x$

2. Fill these blanks.

(1) $e=\lim_{x\to 0}(1+\square)^{\square}$ (2) $e=\lim_{x\to\infty}(1+\square)^{\square}$ (3) $\dfrac{dy}{dx}=\dfrac{1}{\square}$

3. These are $x\to y\,(R\to R)$ functions. Draw the functions on xy plane.

First, check $\dfrac{d}{dx}f(x)$ and $\dfrac{d^2}{dx^2}f(x)$

(1) $y=\dfrac{2}{x^2+1}$ (2) $y=\dfrac{x^2-3}{x-2}$
(3) $y=\ln(x^2+1)$ (4) $y=\dfrac{\ln x}{x}$ (5) $y=x\sqrt{2-x^2}$